



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

C 417,773

ROBT. B. RIPPENBERG
CONSULTING ENGINEER
CLEVELAND, O.



1

2

3

4

5

6

7

8

DEPARTMENT OF COMMERCE AND LABOR

71-1-BUREAU OF THE CENSUS

S. N. D. NORTH, DIRECTOR.

SPECIAL REPORTS

STREET AND ELECTRIC
RAILWAYS

1902



PREPARED UNDER THE SUPERVISION OF W. M. STEUART
CHIEF STATISTICIAN FOR MANUFACTURES



WASHINGTON
GOVERNMENT PRINTING OFFICE

1905

Transportation
Library

HE

4401

.A25

1962

CONTENTS.

Letter of transmittal	Page. xi
-----------------------------	-------------

PART I.

By EDWARD DANA DURAND, Expert Special Agent.

CHAPTER I.

SCOPE AND METHOD OF INVESTIGATION.

Definition of street and electric railways	3
Period covered	3
Completeness of returns	3
Basis of classification of companies	4
Classification according to power used	4
Classification according to population	4

CHAPTER II.

COMPARISON WITH CENSUS OF 1890.

Difficulty of comparison	6
Comparative summary	6
Number of companies	7
Trackage and motive power	7
Cost of construction	8
Number of employees	8
Number of cars	8
Traffic	9
Traffic in relation to population	9
Car mileage	10
Receipts and expenditures	10
Distribution of income	11
Capital stock and funded debt	11

CHAPTER III.

TRAFFIC.

I. Traffic of companies, classified according to power	12
Number of passengers	12
Density of traffic per mile of track	13
Car mileage	14
Density of passenger traffic per car mile	14
Car hours	15
Accidents	15
Traffic by states in relation to population	16
II. Traffic of companies, classified according to population	17
Number of passengers	18
Relation of traffic to population as affected by size of cities	19
Density of traffic per mile of track	20
Car mileage	21
Passengers per car mile	21
Mileage of freight, mail, express, and other miscellaneous cars	22
Detailed statistics of car mileage of Brooklyn Rapid Transit Company and Manhattan Railway Company	22
Car hours	22
Accidents	23

	Page.
III. Traffic and trackage in selected urban centers.....	23
Relation of trackage to population	24
Relation of traffic to population.....	25
Passengers per mile of track	26
Passengers per car mile	26
IV. The urban street railway as a social factor	26
Distribution of urban population by street railways	26
Influence of electric railways on suburbs	28
Effect of street railways in concentrating business.....	29
Effect of street railways on land values and rents.....	30
Relation of street railways to the social life and recreations of the people	30
Street railway parks	30
V. Inadequacy of present street railway facilities in great cities	31
Inadequate speed and carrying capacity.....	31
Effects of inadequacy in transportation.....	32
Increase in demand for transportation more rapid than increase in population	33
Local concentration of traffic	33
Unequal distribution of traffic	33
Causes limiting speed and carrying capacity of surface railways.....	34
Elevated railways	35
Subways.....	36
VI. Street railway fares.....	39
Prevalence of the 5-cent fare	39
Reduced fares open to all classes of passengers	39
Reduced fares for particular classes of passengers.....	40
VII. Transfers.....	41
Prevalence of transfer system.....	41
Causes of the extension of transfer privileges	42
Difficulties in administration of transfer system.....	42

CHAPTER IV.

CAPITALIZATION.

Basis of statistics and method of presentation.....	44
Capitalization of companies, classified according to power	45
Capitalization per mile of track	46
Causes tending to increase capitalization	47
Reconstruction in relation to capitalization.....	47
Capitalization of companies, classified according to population	49
Capitalization of full-time electric surface railways without commercial lighting, classified according to population	49
Capitalization, by states	51
Capitalization of surface railway companies in urban centers of more than 100,000 inhabitants	52

CHAPTER V.

FINANCIAL OPERATIONS.

Companies that failed to report data regarding financial transactions.....	54
I. General income account.....	54
Condensed income account for operating companies, classified according to power	54
Operating earnings and gross income.....	55
Distribution of income.....	55
Sinking and depreciation funds.....	56
Net income and dividends	57
Income account for lessor companies	57
Condensed income account for operating and lessor companies combined.....	58
Condensed income account for operating companies, classified according to population	58
Condensed income account for full-time electric surface railway companies, without commercial lighting, classified according to population	60
Combined income account for operating and lessor companies, classified according to population.....	61
Condensed income accounts, by states.....	62
Taxes in the several states	65
Rentals of leased lines, by states.....	66
II. Analysis of operating earnings.....	66
Operating earnings of companies, classified according to power	66
Operating earnings of companies, classified according to population	67
Operating earnings, by states.....	69

CONTENTS.

v

	Page.
III. Analysis of operating expenses.....	70
Detailed analysis, by states.....	70
Operating expenses of companies, classified according to power.....	76
Operating expenses of companies, classified according to population.....	77
Operating expenses of 17 selected companies in the largest cities.....	79
IV. Analysis of interest and dividends.....	79
Detailed analysis for all companies.....	79
Interest and dividends of companies, classified according to population.....	80
Dividends of leading individual companies.....	81
Dividends, by states.....	82
V. General results of operation.....	82
General results of operation of companies, classified according to power.....	82
Effect of change to electric traction on cost of operation.....	85
General results of operation of companies, classified according to population.....	85
Relation of operating ratio to density of traffic.....	87
Causes affecting the operating ratio.....	88
VI. Balance sheet.....	89
Detailed analysis for all companies.....	89
Cost of construction during the year.....	93

CHAPTER VI.

EMPLOYEES, SALARIES, AND WAGES.

Totals for the United States and for states.....	94
Employees, salaries, and wages of companies, classified according to power.....	94
Employees, salaries, and wages of companies, classified according to population.....	95
Relation of employees to trackage and traffic in the ten largest cities.....	96
Method of presenting wage statistics.....	97
Classified wages for all electric surface railways.....	97
Classified wages for electric surface railways in cities of more than 100,000 inhabitants.....	98
Classified wages for electric surface railways, by states.....	99
Classified wages for fast interurban railways.....	100

CHAPTER VII.

INTERURBAN RAILWAYS—ECONOMIC, FINANCIAL, AND SOCIAL FEATURES.

I. General development and extent.....	101
Difficulties of definition and classification.....	101
Statistics of trackage outside the limits of incorporated cities and towns.....	101
Leading centers of interurban railway development.....	102
II. Traffic and earnings of interurban railways.....	103
Earnings per mile of track.....	104
Earnings per car mile.....	105
Operating expenses.....	105
Growth of traffic.....	105
Relation between earnings and population served by fast, long interurban railways.....	105
III. Characteristics and significance of interurban service.....	107
Traffic of selected interurban railways.....	108
Small units and frequent service.....	110
Frequency of stops.....	110
Cost of operation and fares lower than for steam railways.....	110
Comparative fares of steam and electric railways in Ohio.....	110
Operation in the streets of towns and cities.....	110
Other advantages of electric lines for interurban service.....	111
Nature and social advantages of passenger traffic.....	111
Nature of freight and express traffic.....	112
Influence of interurban railways on local retail business.....	112
Effect of electric interurban railways upon retail business in small towns.....	114
IV. Influence of interurban electric railways on steam railways.....	116
Replies of steam railways regarding the effect of electric railway competition.....	117

CHAPTER VIII.

CONSOLIDATION OF STREET RAILWAYS.

General tendency and its results.....	120
Methods of combination.....	121
Street railway consolidation in New York city.....	123
Street railway consolidation in Philadelphia.....	124

CONTENTS.

CHAPTER IX.

FRANCHISES, PUBLIC REGULATION, AND PUBLIC OWNERSHIP.

	Page.
I. Method of granting franchises	126
Authority of state and municipal governments	126
Consent of voters or of abutting owners	127
Competitive bidding for franchises	128
II. Duration of franchises	128
III. Regulation of street railway fares	130
IV. Compensation for franchise privileges	131
Car licenses	131
Paving and care of streets	132
Percentage of gross receipts	132
Other forms of payment	132
V. General considerations regarding the regulation of fares and compensation	132
Publicity of accounts	133
Regulation of capitalization	133
Sliding scale systems	133
VI. Municipal ownership	135
VII. Condensed digest of state laws and local franchise regulations in leading states	136
California	136
Colorado	137
Connecticut	137
Georgia	137
Illinois	137
Indiana	138
Iowa	139
Kentucky	139
Louisiana	139
Maine	140
Maryland	140
Massachusetts	140
Michigan	142
Minnesota	142
Missouri	143
New Jersey	143
New York	143
Ohio	144
Oregon	145
Pennsylvania	146
Rhode Island	147
Virginia	147
Washington	148
West Virginia	148
Wisconsin	148

CHAPTER X.

STREET RAILWAYS IN EUROPEAN COUNTRIES.

I. United Kingdom	149
Comparison with the United States	149
Municipal ownership	150
Individual cities	150
II. Germany	152
Comparison with the United States	152
Municipal ownership	153
Individual cities	153
III. France	154
IV. Austria	155
V. Hungary	155
VI. Netherlands	156
VII. Belgium	156
VIII. Switzerland	156
IX. Italy	156
X. Spain	156

CONTENTS.

vii

PART II.

By THOMAS COMMERFORD MARTIN, Expert Special Agent.

CHAPTER I.

HISTORY AND DEVELOPMENT OF ELECTRIC TRACTION.

CHAPTER II.

ROADBED, TRACK, AND ELECTRIC CONSTRUCTION.

	Page
I. Roadbed and track	172
Track statistics	172
Roadbed construction	173
Track construction on selected railways	174
Bonding	177
II. Rails and conduits	178
Third-rail systems	179
Conduit systems	179
III. Electric line construction	181
Span wire construction	181
Side bracket construction	182
Center pole construction	182
Line supports	182
Feeder construction	183
Overhead trolley	183
IV. Bridges, tunnels, and crossings	186
Bridges	186
Tunnels	186
Steam railway crossings	188

CHAPTER III.

CARS AND MISCELLANEOUS EQUIPMENT.

I. Street railway cars	189
General statistics	189
Distribution of cars	189
Express, freight, and mail cars	189
Work and miscellaneous cars	190
Snowplows and sweepers	190
II. Passenger cars	190
Early styles	190
First electric cars	192
Modern electric cars	193
III. Elevated railway cars and practice	196
IV. Motor and controller equipment	198
Early motors	198
Modern motors	199
Controllers	199
Number of motors per car	200
Multiple unit system	200
V. The overhead trolley contact	203
VI. Brakes	203
VII. Car fenders	205
VIII. Car lighting	206
IX. Car heating	207
X. Registration of fares	207
XI. Street railway passenger stations	208
XII. Car houses	209
Statistical presentation	209
Construction and equipment	210
Lighting of buildings, shops, car houses, ways, etc.	211
XIII. Telephone service	212

CHAPTER IV.

INTERURBAN RAILWAY CONSTRUCTION AND EQUIPMENT.

Third-rail traction	214
Passenger cars	215
Freight and express service	216

CHAPTER V.

POWER HOUSES, EQUIPMENT, AND OUTPUT.

	Page.
I. Power plant and generating equipment.....	218
Location of power house.....	219
Construction of power houses.....	220
Equipment of power houses.....	220
Kingsbridge power plant.....	222
II. Substations.....	223
Manhattan (elevated) system.....	223
III. Power—consumption of, and cost.....	223
Power plant capacity.....	224
Car hours.....	226
Thermal efficiency.....	227
Street railways operating electric light and power plants.....	229

LIST OF TABLES.

Table 1.—Comparative summary: 1902 and 1890.....	6
Table 2.—Comparative summary, by geographic divisions: 1902 and 1890.....	6
Table 3.—Comparative size of operating companies: 1902 and 1890.....	7
Table 4.—Comparative summary of track mileage, classified according to motive power: 1902 and 1890.....	8
Table 5.—Relation of traffic to population by geographic divisions: 1902 and 1890.....	9
Table 6.—Distribution of the gross income of operating companies to leading items of expenditure: 1902 and 1890.....	11
Table 7.—Traffic of companies, classified according to power: 1902.....	12
Table 8.—Accidents on street and electric railways: 1902.....	15
Table 9.—Accidents on railways, classified according to power: 1902.....	16
Table 10.—Relation of passenger traffic to total population and urban population (places of 4,000 inhabitants or over), by states and territories: 1902.....	17
Table 11.—Traffic of companies, classified according to population: 1902.....	18
Table 12.—Traffic of full-time electric surface railways, without commercial lighting, classified according to population: 1902.....	18
Table 13.—Relation of trackage and traffic to population in selected urban centers with population of from 25,000 to 100,000: 1902.....	19
Table 14.—Relation of trackage and traffic to population in selected urban centers with population of less than 25,000: 1902.....	19
Table 15.—Relation of trackage and traffic to population in groups of urban centers: 1902.....	19
Table 16.—Distribution of full-time electric surface railway companies, without commercial lighting, in the various population groups, according to number of fare passengers carried per mile of track operated: 1902.....	20
Table 17.—Distribution of full-time electric surface railway companies, without commercial lighting, in the various population groups, according to number of fare passengers carried per passenger-car mile.....	22
Table 18.—Accidents on railways, classified according to population: 1902.....	23
Table 19.—Trackage and traffic in urban centers of 100,000 population and over: 1902 and 1890.....	24
Table 20.—Capitalization of companies, classified according to power: 1902.....	45
Table 21.—Capitalization of companies, classified according to population: 1902.....	49
Table 22.—Capitalization of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	50
Table 23.—Distribution of full-time electric surface railway companies, without commercial lighting, in the several urban and interurban groups, according to capitalization per mile of track: 1902.....	50
Table 24.—Capitalization of surface railway companies in individual urban centers of 100,000 population and over: 1902.....	52
Table 25.—Condensed income account for operating companies, classified according to power: 1902.....	55
Table 26.—Percentage distribution of gross income of operating companies, classified according to power: 1902.....	56
Table 27.—Income account for nonoperating lessor companies: 1902.....	58
Table 28.—Condensed income account for operating and lessor companies combined: 1902.....	58
Table 29.—Percentage distribution of gross income for operating and lessor companies combined: 1902.....	58
Table 30.—Condensed income account for operating companies, classified according to population: 1902.....	59
Table 31.—Percentage distribution of gross income of operating companies, classified according to population: 1902.....	59
Table 32.—Condensed income account for full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	60
Table 33.—Percentage distribution of gross income of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	61
Table 34.—Condensed income account for operating and lessor companies combined, classified according to population: 1902.....	61
Table 35.—Percentage distribution of gross income for operating and lessor companies combined, classified according to population: 1902.....	62
Table 36.—Gross income of operating companies, by states and territories: 1902.....	62
Table 37.—Condensed income account for operating companies, by states and territories: 1902.....	63
Table 38.—Analysis of deductions from income (taxes and fixed charges) of operating companies, by states and territories: 1902.....	64
Table 39.—Income account for nonoperating lessor companies, by states: 1902.....	65
Table 40.—Condensed income account for operating and lessor companies combined, by states: 1902.....	65
Table 41.—Percentage of taxes to income, for street and interurban railways, in selected states: 1902.....	66
Table 42.—Operating earnings of companies, classified according to power: 1902.....	67

CONTENTS.

ix

	Page.
Table 43.—Percentage distribution, by sources, of operating earnings of companies, classified according to power: 1902.....	67
Table 44.—Operating earnings, by sources, of companies classified according to population: 1902	68
Table 45.—Percentage distribution, by sources, of operating earnings of companies, classified according to population: 1902	68
Table 46.—Operating earnings, by sources, of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902	68
Table 47.—Percentage distribution, by sources, of operating earnings of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	68
Table 48.—Analysis of gross earnings from operation, by states and territories: 1902	70
Table 49.—Analysis of operating expenses, by states and territories: 1902.....	72-75
Table 50.—Percentage distribution of operating expenses of operating companies: 1902.....	76
Table 51.—Operating expenses of companies, classified according to power: 1902	77
Table 52.—Percentage distribution of operating expenses of companies, classified according to power: 1902.....	77
Table 53.—Operating expenses of companies, classified according to population: 1902	78
Table 54.—Percentage distribution of operating expenses of companies, classified according to population: 1902.....	78
Table 55.—Operating expenses of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902	78
Table 56.—Percentage distribution of operating expenses of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	78
Table 57.—Percentage distribution of operating expenses for 17 selected electric surface railway companies in the largest cities: 1902	79
Table 58.—Interest and dividends of operating and lessor companies combined: 1902.....	80
Table 59.—Interest and dividends of operating and lessor companies, classified according to population: 1902.....	80
Table 60.—General results of operation, all companies, classified according to power: 1902	82
Table 61.—Distribution of railway companies in the several groups, classified according to power, with respect to their operating ratio: 1902.....	84
Table 62.—General results of operation of companies, classified according to population: 1902.....	86
Table 63.—General results of operation of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	86
Table 64.—Distribution of railway companies in the several urban and interurban groups, according to their operating ratios: 1902.....	87
Table 65.—Distribution of full-time electric surface railway companies, without commercial lighting, in the several urban and interurban groups, according to their operating ratios: 1902.....	87
Table 66.—Distribution of full-time electric surface railways, without commercial lighting, according to number of fare passengers carried per mile of track operated and according to operating ratio: 1902	88
Table 67.—Distribution of full-time electric surface railways, without commercial lighting, according to number of fare passengers carried per car mile and according to operating ratio: 1902.....	88
Table 68.—Balance sheet for operating and lessor companies, by states and territories: 1902	90, 91
Table 69.—Employees, salaries, and wages of companies, classified according to power: 1902	95
Table 70.—Employees, salaries, and wages of companies, classified according to population: 1902	95
Table 71.—Employees, salaries, and wages of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.....	96
Table 72.—Wage-earners and salaried employees of surface railways, in the ten largest cities: 1902.....	96
Table 73.—Distribution of wage-earners of all electric surface railway companies according to daily wages received: 1902	97
Table 74.—Median rates of wages and percentage of wage-earners receiving median rates, and rates above and below median rates, on electric surface railways: 1902	98
Table 75.—Distribution of wage-earners of electric surface railways in cities of 100,000 population and over, according to daily wages received: 1902	99
Table 76.—Median rates of wages and percentage of wage-earners receiving median rates, and rates above and below median rates, on electric surface railways in cities of 100,000 population and over: 1902.....	99
Table 77.—Distribution of wage-earners of fast, long interurban railways, according to daily wages received: 1902	100
Table 78.—General results of operation of 53 fast, long interurban railway companies: 1902.....	104
Table 79.—Relation of trackage and operating earnings to population served in the case of selected fast, long interurban railways: 1902	106
Table 80.—Distribution of operating companies according to length of line: 1902 and 1890	121
Table 81.—Trackage, traffic, and financial statistics of tramways in the United Kingdom: 1902, 1901, and 1898	149
Table 82.—Traffic and financial statistics of tramways in leading cities of the United Kingdom: 1902	151
Table 83.—Trackage, traffic, and financial statistics of street railways in Germany and Prussia: 1901.....	152
Table 84.—Trackage, traffic, and financial statistics of street railways in the leading cities of Germany: 1901	153
Table 85.—Trackage, traffic, and financial statistics of street railways in France and in leading French cities: 1901.....	154
Table 86.—Single track mileage and percentage each class is of total: 1902	172
Table 87.—Power plant capacity, railway companies which do not sell current, classified according to population: 1902	224
Table 88.—Power plant capacity, railway companies which sell current, classified according to population: 1902.....	224
Table 89.—Power consumption, selected electric railways, by states: 1902.....	226
Table 90.—Income—electric light and power plants operated by street railway companies, by states: 1902.....	229
Table 91.—Detailed description of service—electric light and power plants operated by street railway companies, by states: 1902..	230

CONTENTS.

GENERAL TABLES.

	Page.
Table 92.—Average number of employees and total salaries and wages, operating companies, by states: 1902	232-235
Table 93.—Name, location, length of track, capital stock, and funded debt, by companies: 1902	236-275
Table 94.—Roadbed, track, and electric construction, by companies: 1902	276-303
Table 95.—Cars and miscellaneous equipment, by companies: 1902	304-327
Table 96.—Power and generating plants, by companies: 1902	328-351
Table 97.—Passengers, car mileage, car hours, maximum speed, accidents, etc., by companies: 1902	352-375
Table 98.—Wage-earners, at specified daily rates of pay and median rate, on electric surface railways, by states: 1902	376-383
Supplementary Table 1.—Bridges and tunnels owned by street railway companies	384-390
Supplementary Table 2.—Feeder conduit system, length in miles	391
Supplementary Table 3.—Water wheels and gas engines	392, 393
Supplementary Table 4.—Alternating-current dynamos	393-396
Supplementary Table 5.—Auxiliary electric equipment	397-400
Supplementary Table 6.—Substation equipment	401-403

APPENDICES.

APPENDIX A.—Street railways	407-411
APPENDIX B.—Instructions to special agents	413-421

LIST OF ILLUSTRATIONS.

Map—Electric railways of Ohio	102
Map—Electric railways of Indiana	104
The "John Mason," original street car	160
A "bobtail" car still in use in 1902 at Decatur, Alabama	160
Typical entrances and exits, Boston subway	186
One of the passenger stations in the Boston subway	186
Trolley mail and passenger car, Boston, Massachusetts	190
Interurban trolley express car in Michigan	190
Truck for heavy double-truck trolley car	192
Maximum traction truck	192
Heavy type cantilever truck for trolley car	194
Type of snow plow	194
Primitive type of under-car trolley or conduit contact, Cleveland, Ohio	196
Interior of a semiconvertible car	196
Heaviest American street cars on streets of Chicago	198
Heavy car of Chicago City Railway system	198
Interurban passenger and express car, Wilkesbarre and Hazleton Railway	200
Interurban car in use on Union Traction system of Indiana	200
Interurban car on Cleveland, Elyria and Western Railway	202
Long type of open car in use at Buffalo, New York	202
Types of street railway car fenders	206
A typical trolley park in Massachusetts	208
Exterior of first American trolley sleeping car	214
Interior view of first American trolley sleeping car	216
Typical interior modern trolley power house, Kingsbridge, New York city	222
Typical waterside street railway power house, Baltimore, Maryland	224
Manhattan Elevated Railway station and power substation, New York city	224
The rotary converters in a Manhattan Elevated Railway substation	226
The step-down transformers in a Manhattan Elevated Railway substation	226
Switchboard in a Manhattan Elevated Railway substation	228

LETTER OF TRANSMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
BUREAU OF THE CENSUS,

Washington, D. C., September 1, 1904.

SIR:

I have the honor to transmit herewith a report on the street and electric railways of the United States for the year ending June 30, 1902. This report has been prepared in the Bureau of the Census under the supervision of Mr. W. M. Steuart, chief statistician for manufactures, in accordance with the provisions of section 7 of the act of Congress of March 6, 1902.

The data were collected by the regular force of the office, the fieldwork being started on October 25, 1902. The results of the investigation were published on June 5, 1903, as Census Bulletin No. 3. Each railway company was called upon by a representative of the office, and all made returns, with the exception of a few named in the report.

The inquiries concerning the financial operations of street and electric railway companies were in conformity with a schedule devised by the Street Railway Accountants' Association of America. As a rule, the information called for in this schedule could be obtained from the books of the different companies, but in a few cases it was necessary to make estimates. The inquiries concerning the physical equipment of the roads were formulated after a conference with street railway officials and others familiar with the requirements of the industry. It is believed that they have resulted in securing information which is of particular interest. The statistics were tabulated, the results summarized, and the final tables prepared by the official clerical force. The text of the report has been prepared by Mr. T. Commerford Martin, of New York city, and Mr. E. Dana Durand, of the Bureau of Corporations of this Department, working in collaboration.

Very respectfully,



Director.

Hon. VICTOR H. METCALF,
Secretary of Commerce and Labor.

STREET AND ELECTRIC RAILWAYS

PART I

STREET AND ELECTRIC RAILWAYS.

PART I.

By EDWARD DANA DURAND, Expert Special Agent.

CHAPTER I.

SCOPE AND METHOD OF INVESTIGATION.

Definition of street and electric railways.—The statistics in this report cover all electric railways in the United States irrespective of their length or location and all street railways irrespective of their motive power. In the corresponding investigation at the census of 1890 the term "street railways" was used as defining the scope of the statistics. At that time practically all railways, except ordinary steam railways, could be correctly designated by this term, as they were confined mainly to urban districts and operated almost exclusively upon the public streets and roads. During the past few years there has been an extraordinary development of electric railways outside the limits of cities and villages, and a considerable proportion of these suburban and interurban lines are located on private rights of way and not on the public thoroughfares. Hence the more inclusive term "street and electric railways" has been adopted, as covering more adequately the scope of the present investigation. It includes all railways doing a public business except the ordinary steam lines, which report to the Interstate Commerce Commission.

The statistics, in fact, cover the electric business of two steam railways which have either placed electric cars upon part of their tracks in connection with steam trains or have equipped certain tracks exclusively for electric traction. This practice has been most extensively adopted by the New York, New Haven and Hartford Railroad Company. The Pennsylvania Railroad also operates an electric system in New Jersey in connection with the West Jersey and Seashore Railroad. The recent movement of the New York Central and Hudson River Railroad and the Pennsylvania Railroad in determining upon the installation of electric traction for all passenger trains entering their New York termini, together with other electric installations now con-

templated by steam railroads, may mark the approach of a time when all steam lines will have introduced electric traction in connection with steam, or in place of it, and when it will not be possible to distinguish clearly between electric and steam railways. At present the distinction is still a fairly clear one, although the methods and service of some electric interurban lines already resemble those of the steam railways in many important respects.

The present report also includes eleven inclined planes operated separately from other railway systems. These, which for the most part use cable traction, are found in a few cities and towns where steep bluffs exist, notably in Pittsburg. They differ materially in their methods of operation from ordinary street railways. Their traffic is insignificant in comparison with the total for all street and electric railways.

Period covered.—The statistics, as a rule, cover the twelve months ending June 30, 1902, but in a considerable number of instances the reports are for the calendar year 1901 and in a few instances for the calendar year 1902 or for other periods of twelve months. Companies in operation during only part of the year are included, but not companies whose lines were under construction and not yet in operation. The number of companies reporting for only part of the year was 57 out of a total of 817 operating companies. This number includes a few companies which were actually in operation during the entire year but for which, on account of changes in ownership, only partial reports could be secured. These part-time railways, however, are in most instances much less important than a large proportion of those in operation throughout the entire census year, so that the inclusion of them does not materially affect the relations between the totals for the various items.

Completeness of returns.—In most instances the rail-

way companies replied in full to the inquiries in the schedule submitted by the Bureau of the Census. The officials of every company were visited by the special agents of the Bureau, who undertook to secure uniformity in the returns. In some instances the agents found it necessary to make estimates, in conjunction with the officials of the railways, for certain data of which accurate records had not been kept. Most companies, however, and particularly the important ones, kept such records as to permit precise replies. In a few instances only have figures not reported by the companies been supplied by office estimates. Those cases in which information is wholly omitted or in which it has been supplied by estimates made by the Bureau are indicated in connection with the detailed presentation of the statistics.

In the appendix will be found a copy of the schedule employed in this investigation and of the instructions to special agents conducting the fieldwork.

Basis of classification of companies.—The results of street railway operation differ so greatly under different conditions that it becomes necessary, in the presentation of summaries, to group the companies in such a way as to bring together, so far as possible, those which operate under similar conditions. For this purpose two classifications have been made. The first is based chiefly on the kind of power used, one of the groups being further subdivided according to certain operating conditions. The second classification is based upon the distinction between urban and interurban railways, and the urban railways are further divided upon the basis of the population of the urban center served. These classified summaries are the more essential for the presentation of financial data regarding street railways, since these can not be published for individual companies, as is done with the items concerning physical equipment and traffic.

Classification according to power used.—The first method of classification divides the companies into the following groups and subgroups:

1. Electric surface railways.
 - a. Without commercial lighting.
 - b. With commercial lighting.
 - c. Part time.
2. Animal power railways.
3. Steam and electric elevated railways.
4. Cable railways, surface and inclined planes.
5. Steam surface railways.

The companies reporting for only part of the year all operate electric surface lines. The separation of these companies from the other electric surface lines makes it possible to observe more precisely the results of operation under normal conditions.

The separation of the first two subgroups of group 1 is based upon the obvious fact that the running of a lighting plant in connection with an electric railway business must materially affect the operating results for

the railway. Moreover, it is impossible in most of such cases to separate satisfactorily the capital invested or the current expenses for the lighting business from those for the street railway business, so that the returns must necessarily cover both branches. There is no sharp line of demarcation between subgroups *a* and *b*, a large proportion of electric railway companies receiving some income from the sale of light and power. The aim has been to include under subgroup 1 *b* only companies which operate distinctly commercial light or power plants. Most of these companies presented to the Bureau of the Census supplementary schedules regarding the equipment and operations of these auxiliary plants, as far as it was possible to make a segregation, and these supplementary data are included in the present report. A company which sells, incidentally, a small amount of current, especially if the current is delivered to the consumer directly at the dynamo, is placed in subgroup 1 *a*.

A considerable number of street railway companies under 1 *a* and a few under 1 *b*, while operating primarily electric surface lines, have also some trackage operated by cable or animal power or some elevated trackage. Among leading instances of this class may be mentioned the Interurban Street Railway Company, of New York city, which operates a large number of horse cars, the passengers carried constituting a very large proportion of the total horse-car traffic of the United States. In Chicago and San Francisco extensive cable lines are operated by companies which are now primarily electric in their equipment, and the elevated systems in Brooklyn and Boston are operated by the companies which run the surface lines of those cities. In all such instances it is impossible to divide the statistics of the company and apportion them between different kinds of traction. The amount of traffic carried by predominantly electric surface railways on horse, cable, or elevated cars is, however, but a small fraction, probably not more than 2 or 3 per cent, of their aggregate traffic, so that the significance of the totals for the group is not materially affected. On the other hand, the statistics presented for elevated railways, while they do not cover the entire business of this description, doubtless show the typical results of operation. The number of companies operating cable railways predominantly (aside from inclined planes) is now only 3, and the number of exclusively steam street railways is only 3, so that the statistics of these two groups are less significant than those of the larger groups.

Classification according to population.—The second method of classification divides street and interurban railway companies into the following groups:

1. Railways in urban centers of 500,000 population and over.
2. Railways in urban centers of 100,000, but under 500,000 population.
3. Railways in urban centers of 25,000, but under 100,000 population.

4. Railways in urban centers of less than 25,000 population.

5. Fast, long interurban railways.

6. Miscellaneous interurban railways.

Statistics grouped into the 6 classes above named are presented for all companies, whatever the power used, and also separately for those full-time companies which operate electric surface railways without lighting plants.

This classification of companies according to population involves no little difficulty. In the first place the more important street railways are no longer confined, as they were formerly, to a single municipality. They extend into the suburbs and adjacent rural districts, and often to cities and towns at a considerable distance. In determining the area to be credited to a given urban center, the rule followed has been to include all the municipalities reached by the lines of the company, or companies, which serve the city that constitutes the leading component in that center. The statistics of minor railways serving any part of the area thus defined have been added to those of the more central systems, and the population of any additional localities reached by these minor companies. The population of strictly rural areas, through which primarily urban street railway systems pass, has necessarily been disregarded in discussing urban centers, since there is no way of ascertaining what proportion of the inhabitants of such areas are actually within reach of street railway facilities.

Pittsburg and the neighboring cities and towns furnish a striking illustration of the difficulty of ascertaining the population served by a railway company. Of the 469.47 miles of track reported by the 8 Pittsburg companies, 188.19 miles lie entirely outside of the limits of any municipality. Nevertheless, the traffic is so largely carried on within city limits that these companies have been classed as urban rather than interurban. A somewhat similar condition exists in Buffalo, N. Y., and its vicinity, while the railways serving Detroit, Mich., Fall River, Mass., Canton and Akron, Ohio, and several other important cities are so largely interurban that their statistics have been excluded from the urban groups. Not only are certain predominantly urban companies thus engaged to some extent in interurban traffic, but all companies which are predominantly interurban in character likewise carry passengers wholly within city limits and, in many instances, the proportion of passengers thus carried is large.

When, therefore, the attempt is made to compare the population of a given urban center with the number of passengers carried in that center, the result is only approximate, since it is impossible to distinguish between the different classes of traffic carried by a single street railway company. Nevertheless, in most large cities the margin of error arising from these complications is not very great. The totals for the four groups of cities adopted in this report show fairly well the true conditions of urban street railway operation, since all companies whose business is to a large extent interurban have been placed in the fifth and sixth groups.

These considerations point clearly to the heterogeneous character of many of the railways which are classed as interurban. A large part of the traffic of so-called interurban railways is really intraurban. As a general rule all companies which have more than half of their trackage outside of municipal limits have been considered interurban in the present investigation. For the purpose of showing the operating results of the more typical modern interurban railways, 55 companies have been selected, which may be fairly described by the term fast, long interurban lines. No company is included in this group which reported less than 15 miles of single track, or which had more than one-third of its trackage within municipal limits, or which operated cars at a maximum speed of less than 20 miles per hour. The distinction between such interurban railways and those in the miscellaneous group is necessarily more or less arbitrary. Several of the companies in the miscellaneous group operated at least part of their trackage in such a way as to conform to the criteria indicated for fast, long interurban lines. This is notably the case with the Detroit United Railway Company, which yet carries the greater proportion of its passengers wholly within the limits of the city of Detroit, thus rendering the statistics of its total business quite incomparable with those of more strictly interurban lines. Group 6, the miscellaneous interurban class, includes on the one hand such cases as the Detroit United Railway Company, and the Boston and Northern Street Railway Company which serves several of the large cities of eastern Massachusetts, and, on the other hand, many small railways connecting mere villages, or operated in connection with summer resorts. It thus represents such widely varying conditions that the totals are less significant than in the case of any of the other groups.

CHAPTER II.

COMPARISON WITH CENSUS OF 1890.

Difficulty of comparison.—Comparisons between the statistics of street railways for 1890 and 1902 must be made with great caution. In 1890 only 706 out of the 789 street railways in the country made reports to the Census Office. The figures of trackage, cost of construction, number of cars, number of employees, and number of passengers for the remaining 83 companies were either obtained from outside sources or were estimated. The figures thus secured from sources other than certified returns constitute from 4.20 to 10.36 per cent of the totals for the respective items mentioned. The returns of earnings and expenditures and of car mileage were incomplete, even for many of the companies which reported fully other statistics; but these items were not supplemented by estimates, so that the figures given as totals represent from 10 to 20 per cent less than the actual totals for all companies. The degree of error in the statistics of 1890 is more fully discussed in connection with the analysis of the data on each subject. The returns for 1902 were much more nearly complete, as all but two companies covered by the statistics furnished certified returns, and in most cases all inquiries in the schedule were answered.

Comparative summary.—Table 1 contains a summary of the more comparable statistics for all street railways at the censuses of 1890 and 1902, together with the percentages of increase.

TABLE 1.—Comparative summary: 1902 and 1890.

	1902	1890	Percent- age of increase.
Number of companies, operating and lessor.....	987	789	25.1
Length of line, miles ¹	16,651.58	5,783.47	187.9
Length of track, miles ¹	22,576.99	8,123.02	177.9
Cost of construction and equipment.....	\$2,167,634,077	\$389,357,289	456.7
Number of employees.....	140,769	70,764	98.9
Number of passenger cars.....	60,290	32,505	85.5
Number of fare passengers.....	4,774,211,904	2,023,010,202	136.0
Fare passengers per mile of track.....	² 212,217	249,047	³ 14.8
Ratio of operating expenses to operating earnings for companies reporting, per cent.....	57.5	68.4	.....

¹ By "length of line," as used throughout this report, is meant length of first main track or of roadbed. By "length of track" is meant total length of all trackage, including sidings. Thus, in the case of a double track road, "length of track" would be double "length of line."

² Exclusive of trackage of two railways carrying freight only.

³ Decrease.

The 1902 figures include, for cost of construction and equipment, 967 out of 987 operating and lessor companies, while of the 817 operating companies, 797 reported the number of employees, 811 the number of fare passengers, and 799 earnings and expenses. The figures for 1890, except as to ratio of expenses to earnings, cover all companies, though some of them are based partly on estimates.

The contributions of the different sections of the country to the development of the street railway industry are indicated in the following table:

TABLE 2.—COMPARATIVE SUMMARY, BY GEOGRAPHIC DIVISIONS: 1902 AND 1890.

DIVISION.	Year.	Length of track, miles.	LENGTH OF LINE, MILES.					Number of passenger cars.	Number of fare passengers carried.	Total cost.	Number of employees.
			Total.	Electric.	Animal.	Cable.	Steam.				
United States ...	1902	22,576.99	16,651.58	16,230.62	195.21	113.93	111.82	60,290	¹ 4,774,211,904	¹ \$2,167,634,077	¹ 140,769
	1890	8,123.02	5,783.47	914.25	4,061.94	283.22	524.06	32,505	2,023,010,202	389,357,289	70,764
Increase		14,453.97	10,868.11	15,316.37	² 3,866.73	² 169.29	² 412.24	27,785	2,751,201,702	1,778,276,788	70,006
Percentage of increase		177.9	187.9	1,675.3	² 95.2	² 59.8	² 78.7	85.5	136.0	456.7	98.9
North Atlantic.....	1902	10,164.89	7,702.22	7,579.01	66.02	5.50	51.69	31,319	2,618,528,979	1,088,932,237	75,928
	1890	2,961.85	2,063.94	273.22	1,658.51	47.27	84.94	14,651	1,141,187,460	199,404,200	37,412
Increase		7,213.04	5,638.28	7,305.79	² 1,592.49	² 41.77	² 33.25	16,668	1,477,341,519	889,528,037	38,516
Percentage of increase		244.4	273.2	2,674.0	² 96.0	² 88.4	² 39.1	113.8	129.5	446.1	103.0
South Atlantic.....	1902	1,670.15	1,195.29	1,182.04	13.25			4,290	297,198,541	162,507,589	9,839
	1890	611.96	465.93	83.58	307.49	3.70	71.16	1,702	101,647,174	16,125,671	4,139
Increase		1,058.19	729.36	1,098.46	² 294.24	² 3.70	² 71.16	2,588	195,551,367	146,381,918	5,700
Percentage of increase		172.9	156.5	1,314.3	² 95.7	² 100.0	² 100.0	152.1	192.4	907.8	137.7
North Central.....	1902	7,815.32	5,631.59	5,524.28	50.91	56.40		18,643	1,344,000,951	705,553,933	39,405
	1890	2,753.57	1,867.93	384.56	1,229.90	129.69	123.78	11,335	538,309,887	110,741,609	20,314
Increase		5,061.75	3,763.66	5,139.72	² 1,178.99	² 73.29	² 123.78	7,308	805,691,064	594,812,324	19,091
Percentage of increase		183.8	201.5	1,336.5	² 95.9	² 56.5	² 100.0	64.5	149.7	537.1	94.0
South Central.....	1902	1,322.45	1,007.10	959.45	17.75	.90	29.00	3,007	210,103,861	87,294,862	6,731
	1890	968.67	773.05	81.63	559.83		131.59	2,342	98,006,026	24,602,138	3,830
Increase		353.78	234.05	877.82	² 542.08	.90	² 102.59	665	112,098,835	62,692,724	2,901
Percentage of increase		36.5	30.3	1,075.4	² 96.8		² 78.0	28.4	114.4	254.8	75.7
Western.....	1902	1,604.18	1,115.38	985.84	47.28	51.13	31.13	3,031	304,379,572	128,345,456	8,866
	1890	836.97	612.62	91.26	806.21	102.56	112.59	2,475	143,860,655	38,483,671	5,069
Increase		767.21	502.76	894.58	² 258.93	² 51.43	² 81.46	556	160,518,917	84,861,785	3,797
Percentage of increase		91.7	82.1	980.2	² 84.6	² 50.1	² 72.4	22.5	111.6	220.5	74.9

¹ Of the 987 companies, 967 reported the cost of construction and equipment; while of the 817 operating companies, 797 reported the number of employees and 811 the number of fare passengers carried.

² Decrease.

Number of companies.—There were 789 operating and lessor companies in existence at the census of 1890 and 987 in 1902. Of the 706 companies which actually reported in 1890, 681 were in independent operation and only 25 were leased, 5 of the latter reporting their operations separately. At the present time the method of combination by lease, which usually means virtually the absorption of the lessor company, has been extensively adopted. Only 817 of the companies reporting in 1902 were operating companies. Moreover, in several cases, these include companies which were really, by ownership or lease, controlled by other companies, although they made distinct reports to the present census. The number of companies having actual independence of control is, therefore, even smaller than appears from the returns. For instance, 11 companies in the District of Columbia and the adjacent parts of Maryland made separate returns, although all are controlled by a single company.

The small increase in the number of operating companies since 1890 is explained by the fact that railways formerly separate have been merged into systems, a process which is more fully described in Part I, Chapter VIII. As a matter of fact, a considerable number of these merged railways, aside from those held under lease, still continue to maintain a separate corporate existence, being controlled by ownership of their stock, so that the aggregate number of actual street railway corporations at present is considerably greater than appears from the statistics. Where, however, these merged companies have ceased to report operations separately they have not been counted.

Although some railways in small towns, especially in Western states where they were constructed in connection with temporary "booms," have ceased to operate since 1890, a much larger number of new street railways have been constructed. It is impossible, however, to determine by the dates of the charters of the present companies the number of railways established since 1890, since in many cases the companies now in operation are merely reorganizations or combinations of earlier companies.

The combination of street railways has greatly increased the size of many operating railway companies. Moreover, many railways which have not undergone consolidation have extended their tracks very materially since 1890. The difference in the importance of the average railway company at the two census periods may be seen from Table 3, which is based on the number of operating companies.

TABLE 3.—Comparative size of operating companies: 1902 and 1890.¹

	AVERAGE PER OPERATING COMPANY.	
	1902	1890
Length of track, miles	27.63	10.56
Number of passenger cars	74	42
Number of fare passengers carried	5,886,821	2,630,702
Number of employees	177	92

¹The number of operating companies in 1890 was 769 and this number is used in all the computations. In 1902, 817 companies reported trackage and cars, 811 fare passengers, and 797 number of employees, and these numbers have been used respectively.

These figures indicate that the average operating company in 1902 was more than twice as important in both trackage and traffic as the average operating company in 1890.

Trackage and motive power.—As will be seen from Table 1 the increase in the length of line of street railways in 1902, as compared with 1890, is 10,868.11 miles, or 187.9 per cent, and the increase in the length of track is 14,453.97 miles, or 177.9 per cent. By length of line is meant the length of the first main track exclusive of second track and sidings. The length of all track is a more valuable basis for comparison. Double tracks for cars operating in opposite directions cost nearly twice as much, and have nearly twice as great maximum traffic capacity, as a single track with short sidings for cars to pass. In some cities the track used by cars running in one direction occupies one street, while the corresponding track for cars in the opposite direction occupies a parallel street. This is particularly true of Philadelphia, because of its narrow streets. The length of line in such case is double that which would be reported if the two tracks had been laid side by side in a single street, yet the traffic capacity is practically the same.

The fact that the length of line has increased more rapidly than the length of track is due to the recent large extension of street railways in small towns and rural districts. Railways so situated have usually only a single track, while the dense traffic of the large cities, to which the street railways of 1890 were mostly confined, requires double tracks in most instances. In 1880 the length of line of street railways in the United States was 2,050.16 miles, or a little less than one-eighth as great as in 1902.

Table 2 shows that the increase in trackage since 1890 has been largest, 244.4 per cent, in the North Atlantic states, notwithstanding the comparatively high development of street railways in the cities of that division in 1890. A great part of this increase is due to the

extensive construction of interurban railways. The ratio of increase in trackage is least in the South Central states, where the railways are, for the most part, still confined to a few leading cities.

The most striking feature of the street railway development since 1890 has been the replacement of other methods of traction by electricity. The great majority of the companies which used other power in 1890 have since changed to electric power, while practically no new street railways have been constructed which use any other form of traction. Even since the time covered by the present investigation this change has rapidly progressed. The elevated railways in New York city, which used steam up to 1902 and during a portion of that year, and a part of the trackage operated by animal power in that city, have since been equipped for electric traction.

The following table shows the number of miles of track in the United States in 1890 and 1902, grouped according to the character of the motive power. Elevated railways are not separately presented, as in later tables, since this distinction was not made in the statistics of track given by the census of 1890; their trackage is included with that operated by steam and electricity, respectively.

TABLE 4.—Comparative summary of track mileage, classified according to motive power: 1902 and 1890.

CHARACTER OF POWER.	Miles of track, 1902.	Miles of track, 1890.	Percentage of increase.
United States	22,576.99	8,123.02	177.9
Electric	¹ 21,907.59	1,261.97	1,636.0
Animal	259.10	5,661.44	² 95.4
Cable	240.69	488.31	² 50.7
Steam	169.61	711.30	² 76.2

¹Includes 6.06 miles operated by compressed air.
²Decrease.

In 1890 the trackage operated by electric power was less than one-sixth of the total, while in 1902 it had increased to 97 per cent, the track mileage thus operated increasing from 1,261.97 miles to 21,907.59 miles. In 1890 horses or mules were used to haul cars on more than two-thirds of the total track, but in 1902 while 67 companies still used animal power wholly or in part only on 1.1 per cent of the trackage was such power used. The mileage operated by cable decreased 50.7 per cent and that operated by steam 76.2 per cent. It is understood that since the date of the census inquiry the small amount of trackage operated by compressed air has been equipped with electric power.

It is not possible to make an exact comparison of the number of companies using each class of power in 1890 and 1902, as in the former year many companies did not submit individual reports. Of the 686 operating companies which did report in 1890 (counting 5 lessor companies which operated separately), 126 used electric power wholly or in part, 506 animal power, 55 cable

power, and 74 steam power. Of the 817 operating companies in 1902, 747 used electric power wholly or in part, 67 animal power, 26 cable power (including inclined planes), and 9 steam power.

Cost of construction.—For reasons more fully set forth on page 47, the figures for cost of construction as returned by the street railway companies in 1890 can not be considered as in any sense representing the actual amount of cash put into the physical properties. This is even more the case in 1902. Aside from the fact that part of the cost in 1890 was based on census estimates only, the cost of construction, as reported by the companies themselves at both censuses, represented, in many instances, merely the amount of cash or the amount of securities which had been paid for the purchase of a railway or railways already long in operation. The purchase price in such a case is naturally based on earning capacity and not on the original cost of construction or the cost of duplication. The apparent percentage of increase in this item since 1890, 456.7 per cent; can therefore be considered as of only slight significance.

Number of employees.—The reported number of salaried employees and wage-earners on street and electric railways (4.23 per cent of the number in 1890 being estimated or obtained from indirect sources) increased 98.9 per cent during the interval between the two census investigations. The actual increase was probably somewhat greater since 20 companies, with a trackage of 417.03 miles, did not report this item in 1902. Moreover, at the census of 1890, report was made of the average number of employees for the time during which each street railway was in operation. Since at that time there were many roads which had only recently begun operation and which reported for less than an entire year, the total number of employees reported in 1890 was somewhat greater than the number which would have been necessary to conduct an equal amount of business if distributed throughout an entire year in every case. In the present investigation, as more fully explained in Twelfth Census, Volume VII, Manufactures, page lxi, the effort has been made to ascertain what would be the average number of employees, on the assumption of twelve months of operation.

The returns indicate that the number of employees at present bears a considerably smaller ratio to the number of passengers carried than was the case in 1890, and this is doubtless true, though the disparity is exaggerated by the statistics.

Number of cars.—The necessary limit to the size of cars when horses were employed has been greatly extended by the introduction of electricity. The consequent increase in the average size of cars is presumably one cause of the fact that the total number of passenger cars was only 85.5 per cent greater in 1902 than in 1890, despite an increase of 136.0 per cent in the number of passengers carried. The proportion of

passenger mileage (by which is meant the total distance covered by all passengers) to the number of cars owned has increased in still larger measure. In Part II, Chapter III, will be found detailed information regarding the development of cars and the size of the cars at present accepted as standards in the leading cities.

Traffic.—The number of fare passengers reported for street and electric railways rose from 2,023,010,202 in 1890 to 4,774,211,904 in 1902. In 1890, 5.13 per cent of the passengers were estimated or ascertained from unofficial sources, while the figures for 1902 cover 811 out of 817 operating companies.

No separate return of transfer passengers was made in 1890 and, generally speaking, the statistics were based on the number of fare passengers although, in some instances, apparently, the total of fare and transfer passengers was reported and included in the United States total. As a matter of fact, the total number of transfer passengers in 1890 is known to have been comparatively small, while in 1902 the number of passengers carried on free transfers was no less than 1,062,403,392. Where, as in Philadelphia, a charge is made for a transfer, the passenger is counted as a fare passenger.

The actual increase in the number of fare passengers was slightly greater than appears from the figures, since the statistics of 1890, even those based on certified returns, included estimates on the basis of twelve months of operation for those roads operating less than the entire year, while for part-time railways at the present census only the actual number of passengers carried is stated.

At first glance it seems surprising that the average number of fare passengers carried per mile of single track should be considerably less in 1902 than in 1890, the figures being, respectively, 212,217 and 249,047. If, however, the number of transfer passengers could be added to the number of fare passengers, the density of traffic per mile of track would probably appear somewhat greater in 1902 than in 1890. It is well known that the traffic on the leading street railways in the more thickly populated parts of our great cities has become much more dense than ever before. The explanation of the decline in the average number of fare passengers per mile of track is found in the increased length of rides taken by passengers, both in the large cities and on interurban roads—an increase partly attributable to the greater use of transfers—and in the construction of electric railways in small towns, suburban areas, and rural districts, where the number of passengers per mile of track is low. In 1890 the street railways were mainly confined to the large cities and to the more densely populated parts of those cities. Year by year urban railways, with the higher speed which electric traction has made possible, have been able to extend their tracks farther out and to offer longer journeys to their patrons. The average length of ride on the new interurban railways is also much greater than

on railways within city limits. It is quite probable that, taking all street railways together, the passenger mileage, or number of passengers carried 1 mile, per mile of track operated, is larger to-day than it was in 1890, but statistics on this subject are wholly lacking.

The increase of traffic in the different sections of the country, as may be seen from Table 2, does not correspond closely with the increase in trackage. In those sections where, on account of the development of interurban railways, the trackage has been extended most markedly, the number of passengers has naturally risen with less rapidity. Thus, in the North Atlantic section, which shows the greatest addition to trackage, the number of passengers carried increased only 129.5 per cent. The most remarkable augmentation of traffic is in the South Atlantic states, 192.4 per cent. In view of the small increase of track in the South Central states, the fact that 114.4 per cent more passengers were carried in 1902 than in 1890 is striking.

Traffic in relation to population.—Table 5 shows for the country as a whole and its grand divisions the relation between street railway traffic and population at the two census periods.

TABLE 5.—Relation of traffic to population by geographic divisions: 1902 and 1890.

DIVISION.	Year.	POPULATION. ¹		Total number of fare passengers carried.	AVERAGE NUMBER OF RIDES PER INHABITANT.	
		Total.	Urban (in places of 4,000 and over).		Total.	Urban.
United States..	1902	75,994,575	28,372,392	4,774,211,904	63	168
	1890	62,947,714	20,745,974	2,023,010,202	32	98
Increase.....		13,046,861	7,626,418	2,751,201,702	31	70
North Atlantic...	1902	21,046,695	13,613,736	2,618,528,979	124	192
	1890	17,406,969	10,071,957	1,141,187,460	66	113
Increase.....		3,639,726	3,541,779	1,477,341,519	58	79
South Atlantic...	1902	10,443,480	2,049,520	297,198,541	28	145
	1890	8,857,922	1,554,190	101,647,174	11	65
Increase.....		1,585,558	495,330	195,551,367	17	80
North Central....	1902	26,333,004	9,343,213	1,344,000,951	51	144
	1890	22,410,417	6,744,936	538,309,887	24	80
Increase.....		3,922,587	2,598,277	805,691,064	27	64
South Central....	1902	14,080,047	1,896,655	210,103,861	15	111
	1890	11,170,137	1,339,232	98,005,026	9	73
Increase.....		2,909,910	557,423	112,098,835	6	38
Western.....	1902	4,091,349	1,469,268	304,379,572	74	207
	1890	3,102,269	1,035,659	143,860,655	46	139
Increase.....		989,080	433,609	160,518,917	28	68

¹ Population shown is that reported at the census of 1900.

Taking the population as determined by the census of 1900 for comparison with the statistics of traffic for 1902, the average number of rides per inhabitant is 63, as compared with 32 in 1890. To correct the computation for the present census in a rough manner, it may be assumed that during the one and one-half years from

the date of the population census to the middle of the year covered by the statistics of street railways, the population increased at the same ratio as from 1890 to 1900. On this basis the population at the beginning of 1902 would have been somewhat more than 78,300,000, and the average number of rides per inhabitant would be about 61. These figures indicate the great increase in the importance of the street railway as a factor in the life of the people. The table shows very wide differences between the sections of the country in the ratio of rides to total population, as might be expected from the great differences in the proportion of urban population. The South Atlantic states present the greatest percentage of increase in the number of rides per inhabitant, but the patronage of street railways there is still less than one-fourth as great as in the North Atlantic states.

Urban population and the number of street railway passengers are somewhat less closely related at present than in 1890, because of the recent extension of electric railways into rural districts. Nevertheless, more than nine-tenths of the passengers are probably still carried within urban areas, and comparison with urban population will give a much truer idea of the significance of street railway service to the people than comparison with the total population. On the basis of the population census of 1900, the number of street railway rides in 1902 was equal to 168 for every inhabitant of urban areas of 4,000 population and over, as compared with 98 in 1890. If the population of urban centers at the beginning of 1902 be roughly estimated, the average number of rides per urban inhabitant would be reduced to approximately 160 (calculating the increase in urban population for one and one-half years at the same ratio as from 1890 to 1900). Even thus it is seen that there has been a remarkable increase in the patronage of street railways by urban dwellers. Among the causes of this increase may be mentioned the construction of railways in urban communities where they were formerly lacking; the growth in geographic area covered by the larger cities, necessitating more extensive resort to street railway transportation; and the improved character of the service. The ratio of passengers to urban population is now highest in the Western states, next in the North Atlantic states, and lowest in the South Central states. The increase in the number of rides per urban inhabitant has been most marked in the South Atlantic states.

A comparison of the street railway traffic with the population of individual urban centers of more than 100,000 inhabitants for the censuses of 1890 and 1902 is presented elsewhere (page 24).

Car mileage.—The number of miles run by passenger cars on street and interurban railways in 1902 was 1,120,101,944. The report of passenger car mileage in 1890, 383,178,085 miles, did not cover the entire number of street railways in operation. The length of line of the railways for which the 1890 figures were reported was 4,375.81 miles out of a total of 5,783.47

miles. Most of the companies which failed to report car mileage, however, were those with light traffic. The number of passengers carried by companies reporting car mileage in 1890 was 1,775,174,685, or 87.7 per cent of the entire number of passengers for all street railways. If it be assumed that the car mileage represented the same proportion of the total car mileage for all street railways, the increase in car mileage from 1890 to 1902 would be about 155 per cent. Presumably, however, the car mileage reported in 1890 was a somewhat smaller proportion of the total car mileage than the proportion which passengers carried by companies reporting car mileage was of the total number of passengers, so that the actual increase in car mileage may have been slightly less.

The average number of fare passengers per passenger car mile has decreased slightly. Those companies which reported in full both passengers and car mileage in 1890 carried on the average 4.63 passengers per car mile. The railways which did not report car mileage were, for the most part, newer lines with light traffic, and it is possible that if their returns had been secured they would have served to reduce the average number of passengers per car mile for 1890 more nearly to the figure for 1902, which was 4.26. Since street cars are now of much larger size than in 1890, and are probably quite as crowded, the decrease in the number of passengers per car mile is doubtless due chiefly to the fact that the average ride is longer than formerly, and that the street railway service has been extended to areas where the density of the traffic is comparatively low.

Receipts and expenditures.—The total operating earnings for companies reporting earnings in 1890 were \$90,617,211. On the assumption of a 5-cent fare, which is a trifle more than the average for companies which reported both passengers and earnings, the passenger earnings (\$89,711,829) would represent 1,794,236,580 passengers, or not quite nine-tenths of the number carried by all street railways in that year. The operating earnings of all street railways in 1890 were probably, therefore, in the neighborhood of \$100,000,000, as compared with \$247,553,999 for the 799 operating companies which reported this item in 1902.

The operating expenditures reported for 1890, representing the same companies which reported operating earnings, amounted to \$62,011,185, as compared with \$142,312,597 in 1902. Of the reported earnings from operation in 1890, 99 per cent consisted of the receipts from passengers. In 1902, on the other hand, passenger earnings were only 94.5 per cent of the total receipts. There has been a great increase in the revenue derived by street railway companies from the sale of electric current, from freight, mail, and express service, and from advertising.

A comparison of the ratio of operating expenses to receipts for the two census periods can be made with approximate accuracy, since the companies reporting

these items were fairly typical of the street railway business generally at both censuses. Such a comparison shows an extremely interesting change. In 1890 the operating expenses reported were equal to 68.4 per cent of the operating receipts, while in 1902 the corresponding proportion was only 57.5 per cent. The street railways which in 1890 operated exclusively by animal power, and which were at that time much the most important group, showed a ratio of operating expenses to earnings of 73.7 per cent. The great reduction in the ratio of expenses to earnings is not due to an increase in the number of passengers carried per mile of track or per car mile, but is chiefly attributable to the economy of operation which has resulted from the introduction of electric traction. The increase in the size of cars and other less important changes in methods have also contributed to lessen expenses. While current expenses have thus been materially reduced in proportion to the traffic, it must be remembered that the fixed charges of street railways have been augmented, for in large measure this economy of operation has been made possible only through larger, though not necessarily proportionately larger, investment of capital.

Distribution of income.—The following table shows the distribution of gross income of street railway companies to different purposes in 1890 and 1902. Since the financial statistics of both censuses, particularly those for 1890, omitted some of the companies, the absolute figures should not be compared, but the proportions which the items bear in each case to the total represent fairly the financial operations of street railways in general at the respective periods.

TABLE 6.—*Distribution of the gross income of operating companies to leading items of expenditure: 1902 and 1890.*

	AMOUNT.		PERCENTAGE.	
	1902 ¹	1890	1902	1890
Gross income from all sources	\$250,504,627	\$91,721,845	100.0	100.0
Operating expenses	142,312,597	62,011,185	56.8	67.6
Fixed charges, total	77,595,053	13,978,903	31.0	15.2
Taxes and licenses	13,078,899	3,308,190	5.2	3.6
Rentals	25,518,225	2,561,343	10.2	2.8
Interest	38,085,911	8,086,216	15.2	8.8
Miscellaneous	912,018	23,154	0.4	(*)
Dividends	15,882,110	10,180,726	6.3	11.1
Miscellaneous payments		1,217,193		1.3
Surplus	14,714,867	4,333,838	5.9	4.8

¹ Not including 18 companies with a trackage of 378.90 miles.

² Less than one-tenth of 1 per cent.

Aside from the relative decrease in operating expenses, already discussed, the more conspicuous changes since 1890, shown by this table, are the great increase in the proportion of total income devoted to taxes, to rentals of leased lines, and to interest on debt. The dividends paid by operating companies were a smaller proportion of their income in 1902 than in 1890. In 1890 the amount paid as interest by such companies was only four-fifths as great as the amount paid in dividends, while in 1902 it was more than twice as great. A comparison of the distribution of income, based on the returns of lessor as well as of operating companies, can not be made because no separate returns of lessor companies were made in 1890.

Capital stock and funded debt.—The statistics of the capitalization of street railways in 1890 were not complete. The length of line for companies reporting both trackage and capitalization at that census was 4,542.88 miles, or 78.5 per cent of the total mileage. The capital stock of these companies amounted to \$272,441,843 and their funded debt to \$176,611,826. The returns for 1902, which are essentially complete, show capital stock of \$1,315,572,960 and funded debt of \$992,709,139. The length of line in 1902 being 16,651.58 miles, it will be observed that the capitalization has increased much faster than the mileage.

The average total capital liabilities per mile of line in 1890 for companies reporting capitalization were \$98,848. In 1902 the capital liabilities, not deducting that part of the capital stock and funded debt which is represented by investments in securities or nonrailway property, but excluding about 50 miles of line leased from steam railroads, amounted to \$139,778 per mile of line. The comparison, based on length of line rather than on length of track, is necessarily imperfect, but the figures on the basis of trackage are not available in the census of 1890. Some of the reasons why an increase of capitalization per mile should be expected are mentioned in Part I, Chapter IV. It is evident that the track, the power plant, and the equipment of a modern electric railway must cost much more than the old-fashioned horse car track and its equipment. The increase in funded debt since 1890 has been more than in proportion to the increase in capital stock. Capital stock constituted 60.7 per cent of the total capital liability reported in 1890 and 57 per cent of the total in 1902.

CHAPTER III.

TRAFFIC.

I.

TRAFFIC OF COMPANIES, CLASSIFIED ACCORDING TO POWER.

From the standpoint of the public welfare the most important information regarding street and electric railways is that which has to do with their traffic.

The details of traffic on each street and electric railway of the country are shown in Table 97, which also presents the totals for each state. The operations of 813 out of 817 operating companies, representing all but 57.29 miles of the trackage, or about 99.8 per cent of the total, are included in this table. Four companies failed to furnish information regarding traffic. As shown in footnotes, moreover, a number of other companies furnished incomplete returns, and therefore the figures for passengers carried and car mileage have

been estimated when necessary, on the basis of other data in the returns or of unofficial information. Two of the 813 companies included in the table handle freight business only.

The totals of the more important items for the United States as a whole are presented in Table 7, which also groups the statistics according to the kind of power and character of service, as explained in Chapter I. It will be remembered that a considerable number of companies classed as electric surface lines operate in part by animal or cable power or on elevated tracks. It should be noted also that the distinction between electric lines which operate lighting plants and those which do not operate them is of much less significance in connection with traffic statistics, as in this table, than in connection with those for finances.

TABLE 7.—TRAFFIC OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric, elevated.	Cable, surface and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time only.				
Number of companies.....	² 813	³ 570	112	57	52	5	14	³
Fare passengers.....	4,774,211,904	4,062,447,908	305,833,612	37,738,491	33,556,832	315,105,775	19,359,341	169,945
Transfer passengers.....	1,062,403,392	994,946,863	48,099,978	2,327,853	11,978,789	1,381,437	5,049,909	14,092
Fare passengers per mile of track constructed.....	² 212,217	216,365	124,304	45,404	214,943	72,226,315	3,142,756	79,650
Passenger-car miles.....	1,120,101,944	942,021,415	84,173,113	12,810,588	5,618,107	4,36	6.16	2.13
Fare passengers per passenger car mile.....	4.26	4.31	3.68	2.95	5.94	4.36		
Mileage of freight, mail, express, and miscellaneous cars.....	⁴ 24,328,522	⁵ 11,776,544	869,823	209,460	21,546	⁶ 11,421,099	1,400	23,650
Total car miles.....	1,144,430,466	953,797,959	85,042,936	13,020,048	5,669,653	83,647,414	3,144,156	108,300
Car miles per mile of track constructed.....	50,820	50,737	34,565	15,665	36,316	366,714	94,961	8,980
Accidents:								
Persons killed.....	1,217	1,059	105	21	6	25	1	
Persons injured.....	47,429	42,740	4,198	242	18	157	74	

¹ Exclusive of reports for 4 companies which failed to furnish this information.

² Includes 2 railways carrying freight only.

³ Exclusive of trackage of 2 railways carrying freight only.

⁴ Includes 15,201,575 car miles run by locomotives on Brooklyn Rapid Transit and Manhattan (elevated) railways.

⁵ Includes 8,983,738 car miles run by locomotives on Brooklyn Rapid Transit Railway.

⁶ Includes 11,217,837 car miles run by locomotives on Manhattan (elevated) Railway.

Number of passengers.—The entire number of fare passengers carried by the street and electric railways during the census year was 4,774,211,904. Of the companies reporting 57 were in operation less than the entire year. These companies, however, were of much less average importance than the full-time companies. Their trackage was only 4 per cent of the total for all companies, and the number of passengers carried by them, 37,738,491, was less than 1 per cent of the total number.

The relation between the number of passengers and the population of the country, both total and urban, has already been presented in connection with the comparison between 1890 and 1902.

The total number of free-transfer passengers carried in 1902 was 22.2 per cent as great as the number of fare passengers. Free-transfer passengers are not to be considered as constituting strictly an addition to the amount of street railway traffic. Of the 811 companies reporting, 408, or almost exactly one-half, grant free

transfers. The total number of transfer points reported is 4,455, an average of nearly 11 for each of the 408 companies.¹ In the few instances where a charge is made for transferring passengers they are counted as fare passengers.

The street railways of the United States carried in 1902 more than seven times as many fare passengers as the steam railways, which transported 649,878,505 persons during the year ending June 30, 1902; but such a comparison means little, since steam railway journeys average very much longer than those on street railways. The average distance traveled by passengers on steam railways is 30.3 miles.² Though no similar figures can be given for street railways, as they do not—and most of them could not—keep records of the distances traveled by their passengers, it is probable that the total distance traveled by passengers on the street railways is less than the total distance traveled by those on steam railways. Another view of the relative importance of passenger traffic on the two classes of railways may be gained by comparing their receipts from passengers. The steam railways in 1902 received \$392,963,248 from passengers; the street railways, \$233,821,548.

Railways which used electric power primarily and which operated chiefly on the surface, carried 92.3 per cent of the fare passengers of all street and electric lines. Though a considerable amount of animal, cable, and elevated trackage is included in this group, it is safe to assume that seven-eighths of the traffic of all the railways covered by the investigation is carried on surface tracks operated by electricity.

The electric lines which operate lighting plants in connection with their railway business, though they are one-fifth as numerous as those without lighting plants and operate more than one-eighth as much track, carried only one-thirteenth as many passengers in 1902. The reason for this condition lies in the fact that, as shown in Table 96, with a few exceptions, the electric railways which operate lighting plants are confined to small and medium-sized towns. The financial statistics show that of urban centers having more than 100,000 inhabitants, only Milwaukee, Toledo, and St. Joseph have railway companies which do a lighting business worthy of the name. There are economies in combining the two kinds of service in smaller towns which do not accrue in such large measure in great cities. In some cases, moreover, particularly in the larger cities, state or municipal law does not permit street railways to do a lighting business. Perhaps the most important reason why street railways in the largest cities do not operate lighting plants lies in the fact that electricity was commercially applied to the production of light before it was applied to street railways. Lighting plants were already established in many cities before

the horse railways had begun to change to electric traction.

Of the other kinds of street and interurban railways those operating exclusively by animal power carried in 1902 only about two-thirds of 1 per cent of the fare passengers. The 5 strictly elevated railways carried about 6.6 per cent of the total number. Of the passengers on these elevated railways, the Manhattan Elevated Railway of New York carried about two-thirds. The 3 purely cable roads in San Francisco carried 15,562,352 passengers, and the 11 inclined-plane cable roads carried 3,796,989.

Density of traffic per mile of track.—No other single factor in street railway business exercises such a powerful influence upon its profitability as the density of traffic. The number of passengers carried by each street railway per mile of track operated is shown in Table 97. The figures for each individual company are based on the total length of track operated by it, including in a number of cases a certain amount of track belonging to other companies and operated jointly under trackage rights. From the standpoint of the individual railway this method gives a more correct basis for calculating the density of its traffic than a computation based on the trackage owned or leased by the company for its exclusive use, for the operating expenses include those incurred upon the tracks used under trackage rights, and the payment to other companies for such use is virtually equivalent to a fixed charge on part of the capital invested in the tracks so operated. The mileage basis used in computing the density of traffic for the United States and for the separate states and groups of companies is the mileage of track constructed, regardless of the question whether any part of such track is operated by more than one company.

The number of passengers per mile of track for the country as a whole is 212,217. If only companies operating the entire year be considered, the number of passengers carried per mile of track is 218,616. This number is independent of the length of journeys, and of course does not represent the number of persons who actually pass over a given length of street railway track during the year. The average density of traffic on electric railways which furnish commercial lighting is less than three-fifths as great as on other electric railways. This results naturally from the fact that the railways furnishing commercial lighting are mainly in the smaller towns of the country. The average density for all full-time electric surface railways combined is 205,478 passengers per mile of track. The fact that roads operated exclusively by animal power show a still greater density of traffic is due to the influence of the four horse car lines in New York city, which carried more than 90 per cent of the total number of passengers reported by the 52 exclusively horse roads in the United States. The average number of fare pas-

¹ For fuller discussion of the subject of transfers, see page 41.

² Report of Interstate Commerce Commission on Statistics of Railways, 1902.

sengers per mile of track owned on these four railways was 989,100. If, however, the mileage operated under trackage rights, which is largely owned by companies primarily electric, be included, the average number of fare passengers per mile of track was 693,923. The other 48 companies of this group, operating in very small towns that do not afford enough traffic to justify the installation of electricity, carried an average of only 24,523 passengers per mile.

It is also primarily because the elevated railways are situated in very large cities that they show a much greater density of traffic than the average for other classes of railways, 1,381,437 passengers per mile of track. Elevated roads perhaps have a somewhat greater possible carrying capacity than surface roads because of their large cars, long trains, and high speed. It may be noted, however, that the number of passengers per mile of track on the Manhattan Elevated Railway in New York city, 1,837,625, only slightly exceeds that on the Third Avenue and Interurban surface systems in that city, 1,612,630 and 1,434,088, respectively. But in making such comparisons it should be recalled that traffic on surface railways is probably somewhat more evenly distributed through the day than that on elevated railways, and also that the average ride on the elevated railways is considerably longer than on the surface lines in the same cities.

The density of traffic on the ordinary cable railways and the inclined plane cables is also high as compared with that of electric railways as a group. The three ordinary cable railways, all in San Francisco, show an average density of 564,877 per mile, which is twice as great as the average density for electric railways in cities of from 100,000 to 500,000 inhabitants. On account of the heavy initial investment required, cable railways are profitable only where traffic is very dense, and they do not, therefore, extend into suburban districts as electric lines do. The still higher density of traffic on inclined planes, 682,912 passengers per mile, is due to the fact that these lines are very short and that the passengers in most instances ride only a fraction of a mile. These inclined plane cables are built, in most cases, up the steep bluffs of river valleys, as, for instance, in Pittsburgh.

Car mileage.—Statistics of car mileage are unsatisfactory because of the difference in the size of cars and in the conditions under which they are operated. Car mileage on a fast interurban railway, which runs cars 50 or 60 feet in length with 150-horsepower motors at an average speed of 20 miles per hour, means quite a different thing from that on a horse railway operating cars 16 feet long at an average speed of 5 or 6 miles per hour. The use of "trailers" is also a source of confusion in some cases. On important street railway lines in Chicago, Washington, and one or two other cities, from one to three trail cars are regularly attached to the power car, while on some other railways trailers are

attached to cars during rush hours, either every day or occasionally. The practice of companies with regard to registration of car mileage where trailers are used is not uniform; sometimes the entire train is treated as the unit; sometimes the individual car. Thus one of the systems in Washington, D. C., uses the first basis for computing car mileage while the other system uses the second. In Chicago, where trailers are more extensively employed than in any other city, the mileage of each car in a train is counted. Where trailers are used the individual cars are usually comparatively small, and in some cases the entire train may carry few more passengers than an ordinary large single car on other urban railways. However, the use of trailers is not sufficiently common to affect materially the totals for groups of companies. The car mileage on the elevated railways represents single cars, but includes that of steam locomotives.

The total distance traversed by street and interurban railway cars, including steam locomotives on elevated roads, in 1902 was 1,144,430,466 miles, or more than 45,000 times the circumference of the earth. About 92 per cent of this mileage was upon railways operating wholly or chiefly by electric traction, and on the surface of the street. Further, the car mileage per mile of track constructed for the country, as a whole, was 50,820. In other words, each mile of track in the country was traversed by an average of 50,820 cars during the year, or 139 cars each day. There is a wide range in the number of car miles per mile of track upon different railways, as is seen in the statistics of companies classified according to population.

On elevated railways each mile of track was traversed on an average by 366,714 cars a year or 1,005 a day. On these railways, cars are usually run in trains of from 3 to 6 cars. The number of car miles per mile of track on the three ordinary cable railways was 103,676; on inclined planes it was 51,776.

The distance traveled over all street and interurban railways by express, mail, freight, work, and miscellaneous cars was 9,126,947 miles in 1902, or less than 0.8 per cent of the total car mileage. The mileage of such miscellaneous cars on elevated, cable, and horse railways is insignificant. The travel of steam locomotives on the elevated railways amounted to 15,201,575 miles. A considerable proportion of the express, mail, and freight traffic is handled on passenger cars, but reference to the statistics of street railway receipts shows that the income from these classes of traffic amounts to only about three-fourths of 1 per cent of the total income of street and interurban railways.

Density of passenger traffic per car mile.—The ratio of the number of fare passengers to the number of car miles run has a very important bearing upon the prosperity of the street railway business. For the country as a whole the average number of fare passengers per

car mile in 1902 was 4.26, the cars running, therefore, on an average, nearly one-fourth of a mile for each fare collected. The figures for each company are given in Table 97. Differences in the size of cars and the length of rides on different railways and groups of railways render comparisons of the density of traffic per car mile misleading, unless the local conditions are thoroughly known. Where passengers ride long distances the number of passengers per car mile is proportionately reduced, and thus a street railway whose cars are always crowded may yet be less profitable than another with apparently lighter traffic, but whose passengers ride shorter distances.

In the absence of information as to the average length of rides, it is impossible to determine in what proportion the capacity of the street railway cars of the country, considered as a whole, is occupied. There are times of the day on most railways, particularly in large cities, when the cars are greatly overcrowded; but there are other times on many railways when the maintenance of a schedule considered satisfactory by the people means the operation of half-empty cars. Not infrequently a railway finds it advantageous to grant liberal transfer privileges, reduce fares, or extend the possible length of journey, in order that new traffic thus created may fill the cars which the regular patrons would in any event consider necessary to a satisfactory schedule. With slight qualifications it may be said that it costs no more to operate a car full than a car empty. When, however, increase of traffic thus secured involves a corresponding addition of cars to the schedule, the advantages to the railway company may disappear.

Though cars on elevated railways are considerably larger than those on ordinary surface lines, the average journey on the elevated is longer, so that the number of fare passengers per car mile is only a fraction greater on these railways than on the electric surface lines as a whole. Indeed, the number of fare passengers per car mile is less on the elevated railways than on the leading surface railways of the same cities. The Manhattan Elevated Railway, of New York, shows 4.78 fare passengers per passenger car mile as compared with 6.51 for the Interurban, and 6.59 for the Third Avenue line.

Similarly, though, the cars operated by animal power are smaller than those operated by electricity, the average ride on the horse car is so much shorter that the ratio of fare passengers to car mileage in New York city, where the greater part of the traffic is found, is higher on horse railways than on electric railways. Three of the 4 horsepower companies in New York city report more fare passengers per car mile than either of the 2 leading electric surface systems in Manhattan borough. A large proportion of the passengers who pay fares on these horse railways are transferred, without charge, to the electric lines. The railways operating by animal power outside of New York, how-

ever, have only 2.25 passengers per car mile, a figure which points to a very low rate of profit.

The 3 ordinary cable railways report 5.09, 5.10, and 5.79 passengers, respectively, per car mile. The rides on the inclined-plane cable railways are so short that they all present a very high ratio, the average being 13.26 fare passengers per car mile. The Monongahela Incline Plane Company, of Pittsburg, shows even 69.15 fare passengers per mile run.

Car hours.—Statistics for the number of hours during which street railway cars run are of significance, since in connection with the statistics of car mileage they show the average speed maintained. Moreover, the number of passengers per car hour is a datum which, to the street railway manager, should be scarcely second in interest to the number of passengers per car mile, since upon it largely depends the outlay for wages of motormen and conductors, as well as various other items of expense. Thus a railway which has fewer passengers per car mile than another may yet be more profitable, if each of its cars earns more fares within a given length of time.

Unfortunately, however, less than half the street railways of the country keep records of car hours. The total number of car hours reported in 1902 by the 390 companies which gave this information was 65,869,342. These companies carried 2,176,886,559 fare passengers; therefore, each car carried an average of 33.28 passengers per hour of operation. Most of the companies reporting car hours are operated by electricity. The 4 elevated railways in Chicago have from 43.21 to 56.93 passengers per car hour; these figures, as might be expected from the high speed of elevated trains, being considerably larger than for most surface railways in great cities.

Accidents.—The following table shows the figures for accidents on street railways. The details for each company are shown in Table 97.

TABLE 8.—Accidents on street and electric railways: 1902.¹

	Persons killed.	Persons injured.
Total	21,218	47,429
Passengers	265	26,690
Employees	122	3,699
Other persons	831	17,040

¹ Exclusive of 4 companies which failed to furnish information concerning accidents.

² One company, with 1,323 accidents, failed to distinguish those killed from those injured, and they are all included in the second column. Three companies, with 23 persons killed and 1,963 injured, reported accidents to passengers and employees under "other persons." One company, with 12 persons killed and 656 injured, reported "other persons" under passengers.

The returns show 1,218 persons killed and 47,429 injured by accidents on street railways. It is believed that the total for persons killed is essentially correct, but the reports of persons injured are known to vary in their completeness as between different companies,

according to the degree of injury deemed sufficient to justify recording. Some companies stated to the agents of the Bureau of the Census that their return of accidents included only injuries of a really serious character; while others asserted that it was impracticable for them to distinguish accurately between serious injuries and the many wholly unimportant accidents reported by conductors, and they, therefore, included all accidents in their report.

In another place will be found statistics showing the large amount of damages collected from railway companies and the large legal expenses incurred in connection with damage suits. It is asserted by the street railway companies that a large proportion of the claims made upon them for damages are altogether unwarranted or greatly exaggerated.

It is noteworthy that 831, or 68 per cent of the persons killed by the street railways, were neither passengers nor employees. The number of passengers killed was 1 for every 18,015,894 fare passengers carried; while 1 passenger was injured for every 178,876 fare passengers carried. The number of street railway employees killed was 122, or 1 out of 1,095 wage-earners employed (omitting officers and clerks). Injured employees numbered 1 for every 36.1 wage-earners. Corresponding proportions for steam railways in the year ending June 30, 1902, were 1 killed to 401, and 1 injured to 24 employed. The risk of accidental death to street railway employees is, therefore, apparently less than two-fifths as great as the risk to steam railway employees, and the risk of injury about two-thirds as great.

The following table shows the number of accidents in relation to the number of car miles operated, for the various groups of street railways as classified according to power:

TABLE 9.—*Accidents on railways, classified according to power: 1902.*¹

CLASS OF RAILWAYS.	Persons killed.	Persons injured.	Number of car miles to each person killed.	Number of car miles to each person injured.
Electric, surface.....	1,185	47,180	887,646	22,295
Animal.....	6	18	944,942	314,981
Elevated.....	25	157	3,345,897	532,786
Cable, surface and inclined planes.	1	74	3,144,156	42,489
Steam, surface.....	0	0		

¹ Exclusive of reports for 4 companies which failed to furnish information regarding this item.

The total number of accidents, particularly those of a fatal character, is so small on the animal power, elevated, and cable railways that comparisons based on the returns of a single year have little value for general conclusions. On the face of the statistics it appears that the elevated railways are much less dangerous than the surface lines. The number of car miles run for each person killed on the elevated lines is 3,345,897, as compared with 887,646 for electric surface railways.

Persons other than passengers and employees are not likely to be killed or injured on elevated railways, while such persons are probably less likely to suffer accidents from horse cars than from other surface cars. The number of persons injured but not killed is, according to the returns, much greater in proportion to the car mileage on electric and cable railways than on animal power and elevated roads.

Traffic by states in relation to population.—The statistics of traffic by states, as presented in Table 97, require no special comment. Comparisons among states are less significant than those among individual cities or groups of cities. It is interesting, however, to compare the amount of street railway traffic in the several states with their population, and more particularly with their urban population, in places of 4,000 inhabitants and over. These data, based on the population census of 1900, are presented in Table 10, which also shows the proportion of urban population to the total population for each state. Similar comparisons for the grand divisions of the country have already been presented in connection with the summary of statistics for 1890 and 1902.

The most important factor in determining the extent of street railway traffic in the different states is obviously the presence or absence of cities, and particularly of large cities. Thus the relative rank of the states in the proportion of street railway rides to total inhabitants corresponds quite closely with their rank as regards the proportion of urban to total population. The proportion of rides to the total population is greatest in the District of Columbia, where the whole population is urban, and is next greatest in Massachusetts, which ranks third among the states in respect to proportion of urban population, 86.9 per cent of all its inhabitants living in places of 4,000 inhabitants and over. In New York, which ranks fourth in the proportion of urban population, the number of rides per inhabitant is next to that for Massachusetts. There are 14 states in which more than 40 per cent of the population is urban; and all of these 14, except New Hampshire and Delaware, report more than 60 street railway rides per inhabitant. On the other hand, only 2 states that have an urban population less than 40 per cent of their total population, namely, Washington and Missouri, report more than 60 rides per inhabitant. There are 7 states and territories which show less than 10 street railway rides per inhabitant, and in no one of these, except Kansas, does the proportion of urban to total population exceed 12 per cent.

A comparison of the number of rides with the number of urban inhabitants in the several states gives some idea of the comparative extent to which street railways are developed, and also of the extent to which they are patronized by those within reach of their service. The number of rides and the number of

urban inhabitants are somewhat less closely related items in such states as Michigan, Ohio, and Indiana, where interurban railways have been developed very extensively, than in states like New York and Pennsylvania, where the great bulk of railway traffic is still confined to urban areas.

TABLE 10.—RELATION OF PASSENGER TRAFFIC TO TOTAL POPULATION AND URBAN POPULATION (PLACES OF 4,000 INHABITANTS OR OVER), BY STATES AND TERRITORIES: 1902.¹

STATE OR TERRITORY.	Number of companies.	Population, 1900.	Total number of fare passengers carried, 1902.	Average number of rides per inhabitant.	Urban population (places of 4,000 inhabitants and over), 1900.	Ratio of urban to total population, percentage.	Average number of rides per urban inhabitant.
United States.....	811	75,994,575	4,774,211,904	63	28,372,392	38.0	168
Alabama.....	9	1,828,697	22,748,871	12	182,448	10.0	125
Arizona.....	2	122,931	797,970	6	13,075	10.6	61
Arkansas.....	7	1,311,564	6,880,479	5	90,396	6.9	76
California.....	35	1,485,053	182,196,999	123	726,655	48.9	251
Colorado.....	7	539,700	42,371,590	79	222,184	41.2	191
Connecticut.....	22	908,420	77,447,101	85	596,250	65.5	130
Delaware.....	3	184,735	9,956,559	54	76,508	41.4	130
District of Columbia.....	8	278,718	66,162,321	237	278,718	100.0	237
Florida.....	6	528,542	8,249,542	16	87,414	16.5	94
Georgia.....	10	2,216,331	32,463,851	15	308,687	13.9	105
Idaho.....	1	161,772	314,340	2	10,003	6.2	31
Illinois.....	49	4,821,560	463,190,986	96	2,460,143	51.0	188
Indiana.....	27	2,516,462	66,255,767	26	770,407	30.6	86
Iowa.....	22	2,231,853	38,559,589	17	456,479	20.5	84
Kansas.....	11	1,470,496	6,832,064	5	282,611	19.2	24
Kentucky.....	12	2,147,174	56,293,852	26	423,646	19.7	133
Louisiana.....	8	1,381,625	55,343,843	40	347,276	25.1	159
Maine.....	19	694,466	25,495,164	37	251,685	36.2	101
Maryland.....	10	1,188,044	99,989,562	84	572,795	48.2	175
Massachusetts.....	75	2,805,346	461,745,615	165	2,437,994	86.9	189
Michigan.....	24	2,420,982	113,916,992	47	900,556	37.2	126
Minnesota.....	5	1,751,394	73,236,612	42	542,251	31.0	135
Mississippi.....	5	1,551,270	3,101,015	2	82,099	5.3	88
Missouri.....	16	3,106,665	211,808,737	68	1,084,014	34.9	195
Montana.....	5	243,329	6,856,502	28	69,989	28.8	96
Nebraska.....	4	1,066,300	22,228,325	21	221,693	20.8	100
New Hampshire.....	7	411,588	11,304,906	27	192,240	46.7	59
New Jersey.....	26	1,843,669	188,976,899	100	1,272,259	67.5	149
New Mexico.....	1	195,310	73,000	37	11,841	6.1	6
New York.....	96	7,268,894	1,144,491,509	157	5,176,414	71.2	221
North Carolina.....	7	1,893,810	5,337,367	3	152,019	8.0	35
Ohio.....	63	4,157,545	286,434,579	69	1,864,519	44.8	153
Oregon.....	6	413,586	18,729,442	45	114,134	27.6	164
Pennsylvania.....	98	6,302,115	642,513,812	102	3,228,337	51.1	199
Rhode Island.....	8	428,556	62,279,165	145	392,509	91.6	159
South Carolina.....	7	1,340,316	9,056,818	7	157,111	11.7	58
Tennessee.....	8	2,020,616	35,697,835	18	285,886	14.1	125
Texas.....	17	3,046,710	30,037,966	10	454,926	14.9	66
Utah.....	3	276,749	11,493,501	42	81,480	29.4	141
Vermont.....	9	343,641	4,274,806	12	72,048	21.0	59
Virginia.....	20	1,854,184	44,275,661	24	305,229	16.5	145
Washington.....	8	518,103	41,544,228	80	188,750	36.4	220
West Virginia.....	8	956,800	21,706,870	23	111,039	11.6	195
Wisconsin.....	17	2,069,042	62,537,300	30	714,556	34.5	88

¹ Exclusive of reports for 6 companies, with a trackage of 80.14 miles, distributed as follows: Colorado, 4.08 miles; Connecticut, 1.36 miles; Illinois, 21.49 miles; Kansas, 39 miles; South Dakota, 2 miles; and Virginia, 12.21 miles.

States having one or two very large cities may be expected to show a higher proportion of rides to urban inhabitants than states which have an equally large percentage of urban population scattered in smaller towns. Thus, in California, which has the highest proportion of rides to urban population (251), the cause is found in the fact that a large proportion of the street railway trackage is in San Francisco, whose hilly streets compel general resort to this method of travel. New York, with her enormous metropolis, ranks third in the ratio of passengers to urban population. The steep streets of the cities in Washington account in part for the high ratio of rides to urban inhabitants in that state. The other states which show more than 150 rides per urban inhabitant are, in the order named: District of Columbia, Pennsylvania, Missouri, West Virginia, Colorado, Massachusetts, Illinois, Maryland, Oregon, Louisiana, Rhode Island, and Ohio.

Only 5 states report fewer than 50 rides per urban inhabitant, and in none of these except Kansas is there a city of more than 25,000 population. The report of the total number of rides for Kansas is quite misleading, since the passengers belonging to Kansas City, Kans., and smaller adjacent towns are included in the returns of the Metropolitan Street Railway, of Kansas City, Missouri.

II.

TRAFFIC OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION.

Table 11 is a summary of the most important items relating to traffic for street and electric railways as classified on the second basis described in Chapter I, according to the population of the centers in which they lie, with the further distinction of "fast, long," and "other" interurban railways.

STREET AND ELECTRIC RAILWAYS.

TABLE 11.—TRAFFIC OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		Over 500,000.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	* 813	66	47	85	315	55	245
Fare passengers.....	4,774,211,904	2,456,542,270	994,327,853	433,049,842	195,219,320	113,820,795	581,251,824
Transfer passengers.....	1,062,403,392	608,062,946	276,401,373	67,695,795	17,255,506	12,158,763	80,829,009
Fare passengers per mile of track constructed.....	* 212,217	491,418	279,320	150,273	87,711	40,139	96,888
Passenger-car miles.....	1,120,101,944	504,811,418	239,940,699	115,411,493	63,571,907	45,354,873	151,007,554
Fare passengers per passenger-car mile.....	4.26	4.87	4.14	3.75	3.07	2.51	3.85
Mileage of freight, mail, express, and other miscellaneous cars.....	* 24,328,522	* 17,842,405	821,948	364,383	617,901	1,719,402	2,962,538
Total car miles.....	1,144,430,466	522,653,823	240,762,647	115,775,826	64,189,808	47,078,275	153,970,087
Car miles per mile of track constructed.....	50,820	104,554	67,633	40,176	28,840	16,627	25,568
Accidents:							
Persons killed.....	1,217	491	221	124	89	90	202
Persons injured.....	47,429	18,289	19,518	3,109	632	1,481	4,400

¹ Exclusive of reports for 4 companies which failed to furnish this information.² Includes 2 railways carrying freight only.³ Exclusive of trackage of 2 railways carrying freight only.⁴ Includes 15,201,575 car miles run by locomotives on Brooklyn Rapid Transit and Manhattan (elevated) railways.

The data in Table 12 are for the same statistical inquiries as in Table 11, but they apply only to full-time electric surface railways not furnishing commercial lighting.

TABLE 12.—TRAFFIC OF FULL-TIME ELECTRIC SURFACE RAILWAYS, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		Over 500,000.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	* 570	48	38	68	168	42	206
Fare passengers.....	4,062,447,908	2,107,329,902	902,333,125	321,659,513	128,602,963	85,162,271	517,360,134
Transfer passengers.....	994,946,863	594,326,985	251,242,536	58,195,785	10,913,058	9,227,851	71,040,648
Fare passengers per mile of track constructed.....	* 216,365	146,527	277,509	150,739	95,204	38,226	101,593
Passenger-car miles.....	942,021,415	427,973,469	220,024,564	86,238,634	39,423,259	35,585,153	132,776,316
Fare passengers per passenger-car mile.....	4.31	4.92	4.10	3.73	3.26	2.39	3.90
Mileage of freight, mail, express, and other miscellaneous cars.....	* 11,776,544	* 6,419,906	821,948	219,872	312,973	1,369,315	2,632,530
Total car miles.....	953,797,959	434,393,375	220,846,532	86,458,506	39,736,232	36,954,468	135,408,846
Car miles per mile of track constructed.....	50,737	92,045	67,921	40,517	29,417	16,588	26,471
Accidents:							
Persons killed.....	1,059	460	200	96	57	68	178
Persons injured.....	42,740	18,117	16,974	2,440	453	1,133	3,623

¹ Exclusive of reports for 2 companies which failed to furnish this information.² Includes 2 railways carrying freight only.³ Exclusive of trackage of 2 railways carrying freight only.⁴ Includes 3,983,738 car miles run by locomotives on Brooklyn Rapid Transit Railway.

Though the presence or absence of a lighting plant in connection with a street railway does not materially affect its traffic conditions, yet for the purpose of comparison with the financial tables, the group of electric railways without commercial lighting only is included in Table 12.

Number of passengers.—The first conspicuous fact which appears in Table 11 is that 2,456,542,270, or more than one-half of all fare passengers on street and interurban railways, were carried by companies in the few urban centers of more than 500,000 population. Urban railways in cities and towns of less than 100,000 population carried less than one-seventh of all fare passengers.

It should be noted that a considerable proportion of the fare passengers of companies classed as interurban are carried wholly within the limits of urban communities, and especially of communities of less than 100,000 population. Thus the whole urban traffic of several important cities, such as Detroit, Mich., Lawrence, Lowell, Worcester, Springfield, and Fall River, Mass., Hartford and New Haven, Conn., and Canton, Akron, and Youngstown, Ohio, is handled exclusively by companies classed, in accordance with the criteria mentioned in Chapter I, as interurban. Even with the deductions indicated, however, the amount of interurban street railway traffic in its strict sense is very con-

siderable. The relative importance of the traffic on the fast, long interurban lines does not fully appear from the statistics of the number of fare passengers, since the average length of journey of passengers and the average fare paid by them on these railways are considerably greater than on urban railways. On the slower interurban lines included in the last column of Table 11, it is frequently the practice to collect separate 5-cent fares for different stages of a journey, so that a single passenger may be reported two or more times; but this practice does not usually prevail on the faster interurban lines, where the business is conducted more in the manner of a steam railway.

The use of free transfers is naturally more developed in great cities having many interlacing street railway lines than in small towns, where cars often run over only a single route, or on interurban railways. The free transfers of elevated railways are not reported, even when they are allowed. In judging the extent to which the transfer system is developed in cities of different sizes, it is preferable to confine attention to full-time electric surface railways without commercial lighting.

For such railways the proportion of free transfers to fare passengers for the largest urban centers, 28.2 per cent, is about the same as for those of the second group, 27.8 per cent. The corresponding proportions

of transfer to fare passengers on railways falling within the other groups are as follows: Urban centers of 25,000 to 100,000 inhabitants, 18.1 per cent; urban centers of less than 25,000 inhabitants, 8.5 per cent; fast, long interurban lines, 10.8 per cent; other interurban lines, 13.7 per cent.

Relation of traffic to population as affected by size of cities.—The influence of the size of cities served by street railways on the amount of their business can be measured only by comparing the number of passengers within each of the urban groups in Table 11 with the aggregate population of the group. Such a comparison, however, is difficult, since many railways that are primarily urban in character extend into rural communities, though serving only an unknown fraction of the population of such communities, while roads that are essentially interurban in character also carry urban passengers. These complexities are so conspicuous in the case of the smaller cities and towns that it is impossible to make a satisfactory comparison between traffic and population for the two groups of urban centers of less than 100,000 population as a whole. From these two groups, however, a considerable number of typical urban centers have been selected, in which the largest part of the street railway traffic lies within municipal limits. The names of the centers thus selected and the population and traffic in each are shown in Tables 13 and 14.

TABLE 13.—*Relation of trackage and traffic to population in selected urban centers with population of from 25,000 to 100,000: 1902.*

NAME OF CENTER.	Popula- tion of center.	NUMBER OF PAS- SENGERS.		NUMBER OF MILES OF TRACK.	
		Total.	Per unit of popula- tion.	Total.	Per 1,000 of popula- tion.
Total.....	1,258,615	135,842,312	107.9	951.93	0.76
Montgomery, Ala.....	30,346	1,849,395	60.9	20.00	0.66
Little Rock, Ark.....	38,307	3,841,415	100.3	20.70	0.54
Sacramento, Cal.....	29,282	3,948,791	134.9	23.50	0.80
Pueblo, Colo.....	28,157	4,065,162	144.4	36.25	1.29
Meriden, Wallingford, Conn.....	31,033	2,589,737	83.5	19.50	0.63
Augusta, Summerville, Ga.....	42,686	2,360,674	55.3	31.02	0.73
Peoria, Peoria Heights, North Peo- ria, Peoria, Ill.....	60,340	6,750,000	111.9	41.25	0.68
Quincy, Ill.....	36,252	2,127,623	58.7	17.28	0.48
Rockford, Ill.....	31,051	1,989,080	64.1	23.00	0.74
Springfield, Ridgely, Ill.....	35,328	3,532,013	100.0	23.88	0.67
Evansville, Howell, Ind.....	60,428	3,629,534	60.1	30.50	0.50
Dubuque, Iowa.....	36,297	2,391,355	65.9	20.85	0.57
Sioux City, Iowa; South Sioux City, Nebr.....	34,000	4,138,944	121.7	43.00	1.26
Topeka, Kans.....	33,608	2,730,287	81.2	28.63	0.85
Lexington, Ky.....	26,309	2,350,682	89.1	15.13	0.57
Bay City, West Bay City, Es- sexville, Mich.....	42,386	1,986,982	46.9	23.30	0.55
Duluth, Minn.; Superior, Wis.....	84,060	9,418,517	112.0	73.84	0.88
Dayton, Ohio.....	85,353	14,667,094	171.9	52.88	0.62
Springfield, Ohio.....	38,253	3,784,338	98.9	28.13	0.74
Altoona, Gaysport, Juniata, Bellwood, Pa.....	46,034	4,759,279	103.4	27.50	0.60
Williamsport, South Williams- port, Pa.....	32,085	2,582,297	80.5	16.41	0.51
Dallas, Tex.....	42,638	6,574,773	154.2	46.30	1.09
Galveston, Tex.....	37,789	2,851,603	75.5	35.86	0.95
San Antonio, Tex.....	53,321	5,268,627	98.8	45.51	0.85
Salt Lake City, Murray, Utah.....	65,833	10,631,591	167.1	78.04	1.37
Richmond, Va.....	85,050	16,313,560	191.8	43.96	0.52
Spokane, Wash.....	26,848	5,028,388	186.5	36.55	0.99
La Crosse, Onalaska, Wis.....	30,263	1,706,728	56.4	17.11	0.57
Oshkosh, Neenah, Wis.....	34,238	1,973,843	57.7	32.00	0.93

TABLE 14.—*Relation of trackage and traffic to population in selected urban centers with population of less than 25,000: 1902.*

NAME OF CENTER.	Popula- tion of center.	NUMBER OF PAS- SENGERS.		NUMBER OF MILES OF TRACK.	
		Total.	Per unit of popula- tion.	Total.	Per 1,000 of popula- tion.
Total.....	718,254	49,179,495	68.5	485.95	0.68
Fort Smith, Ark.....	11,567	731,553	63.1	8.93	0.77
Riverside, Cal.....	7,973	547,051	68.6	9.52	1.19
San Diego, Cal.....	17,700	2,220,000	125.4	16.60	0.94
Santa Barbara, Cal.....	6,587	814,405	123.6	8.50	1.29
New London, Conn.....	17,548	1,320,791	75.3	8.51	0.48
Stamford, Greenwich, Conn.....	18,417	1,327,617	72.1	12.69	0.69
Pensacola, Fla.....	17,747	998,290	56.2	9.00	0.51
Athens, Ga.....	10,245	356,969	34.8	6.53	0.64
Alton, North Alton, Upper Alton, Ill.....	17,487	1,497,130	85.6	12.25	0.70
Cairo, Ill.....	12,566	870,838	69.3	9.67	0.77
Kankakee, Bradley, Bourbonnais, Ill.....	15,708	714,769	45.5	12.78	0.81
Vincennes, Ind.....	10,249	450,000	43.9	8.00	0.78
Burlington, Iowa.....	23,201	1,600,000	69.0	14.50	0.62
Muscatine, Iowa.....	14,073	865,120	61.5	8.60	0.61
Ottumwa, Iowa.....	18,197	1,211,028	66.6	10.00	0.55
Atchison, Kans.....	15,722	533,867	34.0	9.00	0.57
Wichita, Kans.....	24,671	1,460,000	59.2	18.50	0.75
Shreveport, La.....	16,013	1,450,000	90.6	8.80	0.55
Biddeford, Saco, Me.....	22,267	728,909	32.7	8.15	0.37
Benton Harbor, St. Joseph, Mich.....	11,717	1,198,826	102.3	10.50	0.90
Marquette, Mich.....	10,058	373,672	37.2	7.00	0.70
Menominee, Mich.....	12,816	529,764	41.3	6.71	0.52
Vicksburg, Miss.....	14,834	1,188,289	80.1	8.75	0.59
Springfield, Mo.....	23,267	1,700,715	73.1	19.10	0.82
Great Falls, Mont.....	14,930	939,436	62.9	11.90	0.80
Concord, N. H.....	19,632	1,610,856	77.0	12.71	0.65
Laconia, N. H.....	8,042	436,171	54.2	3.87	1.10
Long Branch, Deal, Allenhurst, Asbury Park, Bradley Beach, Neptune City, Belmar, N. J.....	16,148	3,737,541	231.4	23.68	1.47
Perth Amboy, Metuchen, N. J.....	19,485	880,128	45.2	9.06	0.46
Dunkirk, Fredonia, N. Y.....	15,743	681,770	43.3	7.00	0.44
Kingston, N. Y.....	24,535	2,217,334	90.4	9.16	0.37
Ogdensburg, N. Y.....	12,633	478,283	37.9	10.00	0.79
Ashtabula, Ohio.....	12,949	999,857	77.2	5.75	0.44
Lima, Ohio.....	21,723	1,375,979	63.3	18.55	0.85
Tiffin, Ohio.....	10,989	482,000	43.9	7.33	0.67
Zanesville, Ohio.....	23,538	1,800,000	76.5	10.00	0.42
Sayre, Athens, Pa.; Waverly, N. Y.....	9,481	1,059,507	111.8	9.11	0.96
Tarentum, New Kensington, Pa.....	10,137	622,447	61.4	6.61	0.65
Greenville, S. C.....	11,860	537,608	45.3	7.00	0.59
Austin, Tex.....	22,258	1,213,703	54.5	13.38	0.60
Waco, Tex.....	20,686	1,605,525	77.6	16.29	0.79
Ogden, Utah.....	16,313	861,910	52.8	11.00	0.67
Burlington, Winoski, Vt.....	22,423	1,270,136	56.6	11.22	0.50
Everett, Wash.....	7,838	971,650	124.0	9.65	1.23
Ashland, Wis.....	13,074	503,658	38.5	7.68	0.59
Janesville, Wis.....	13,185	304,398	23.1	7.41	0.56

The totals for the selected towns are shown in Table 15, which also presents a comparison of population and traffic for the two groups of urban centers of more than 100,000 population, the statistics including all the cities of each group. The details for individual cities of these two groups are given on page 24.

TABLE 15.—*Relation of trackage and traffic to population in groups of urban centers: 1902.*

	All centers over 500,000 population.	All centers of 100,000 but under 500,000 popu- lation.	Twenty- nine select- ed centers of 25,000 but under 100,000 popu- lation.	Forty-six selected centers of less than 25,000 popu- lation.
Total population served.....	10,274,470	5,380,647	1,258,615	718,254
Number of miles of track.....	4,998.89	3,550.82	951.93	485.95
Miles of track per 1,000 of population.....	.49	.66	.76	.68
Number of passengers.....	2,456,542,270	994,827,858	135,842,312	49,179,495
Number of rides per in- habitant.....	239.1	184.7	107.9	68.5

The totals of population and traffic for the four groups present a fairly correct view of the density of street railway traffic in its relation to the size of cities. The table also shows the relation of trackage to population. A discussion of the relation between population and traffic in the case of interurban railways will be found in Part I, Chapter VII.

The proportion of street railway trackage to the population is considerably less in cities of over 500,000 population than in other cities. In the largest cities, with their closely built houses and tenements, the number of inhabitants tributary to a given trackage is greater than in smaller cities; even though street railways in the more thickly populated parts of these large cities may be run on almost every street. In the smallest cities, however, the total populated area is so restricted that a large proportion of the people find little occasion to use street railways at all, and so the proportion of trackage to population is not materially different from that in cities of from 100,000 to 500,000 inhabitants, though the population of smaller cities is much more scattered. Indeed, the trackage per 1,000 inhabitants in selected centers of less than 25,000 inhabitants is actually less than that reported for centers of from 25,000 to 100,000 inhabitants.

As the size of the urban center diminishes the number of street railway rides per inhabitant decreases rapidly. In cities of more than 500,000 inhabitants each person, on the average, rode 239 times during the year, while in the selected centers of less than 25,000 inhabitants each person rode, on the average, only 68 times during the year. In comparing passengers with population in the larger cities it should be borne in mind that the great numbers of transient visitors to such cities, who are not enumerated in the census of population, contribute materially to the street railway traffic. Due allowance for this fact having been made, it yet remains true that the permanent residents of such cities patronize the railways much more than the inhabitants of small towns. The reason for this fact is obvious. As cities increase in size a constantly greater proportion of the people, despite the crowding together, live far from their places of business and are forced to use the street railway daily.

Density of traffic per mile of track.—In comparing the number of passengers per mile of track in urban centers of different sizes, as shown in Tables 11 and 12, it should be borne in mind that the average distance traveled by passengers is greater in the large cities than in those of smaller population. Despite this fact, the proportion of fare passengers carried to track mileage increases very rapidly as the size of urban centers increases. In urban centers of the first group the railways, as a whole, in 1902 carried 491,418 fare passengers per mile of track, while the full-time electric surface railways, without commercial lighting, as shown in Table 12, carried 446,527 fare passengers per mile. The traffic on

such electric surface lines in urban centers of 100,000 to 500,000 population is only about three-fifths as dense; in centers of 25,000 to 100,000 inhabitants, about one-third as dense; and in still smaller urban centers, about one-fifth as dense, as on similar railways in the largest cities.

The number of fare passengers per mile of track on fast, long interurban lines, without commercial lighting, operating the entire year, was 38,226, and on other interurban lines covered by Table 12, 101,593. On the fast, long interurban railways the average ride of passengers, however, is decidedly longer than on urban railways.

Averages for density of traffic might be vitiated by the undue influence of a few companies having extremely high or extremely low density of traffic. To guard against such errors Table 16 has been prepared, which shows the number of street railways within each population group reporting traffic of different degrees of density.

TABLE 16.—Distribution of full-time electric surface railway companies without commercial lighting, in the various population groups, according to number of fare passengers carried per mile of track operated: 1902.¹

PASSENGERS PER MILE OF TRACK.	Total.	NUMBER OF COMPANIES.					
		Urban centers, population.					Interurban railways.
		500,000 and over.	100,000 to 500,000.	25,000 to 100,000.	Under 25,000.	Fast, long.	Other.
Total	568	48	38	68	168	42	204
Under 25,000.....	72	4	—	2	8	17	41
25,000 but under 50,000	86	1	1	3	23	14	44
50,000 but under 100,000	191	10	3	13	75	10	80
100,000 but under 200,000	150	13	7	40	54	1	35
200,000 but under 300,000	36	3	15	8	6	—	4
300,000 but under 400,000	16	4	8	2	2	—	—
400,000 and over	17	13	4	—	—	—	—

¹ Exclusive of reports for 2 companies carrying freight only and 2 companies which failed to furnish this information.

The table includes only full-time companies operating primarily electric surface railways, and not furnishing commercial lighting. The companies, of course, differ greatly in the amount of track operated. Thus there are in some of the large cities a considerable number of small railway lines, usually in the outskirts, the traffic of which is insignificant as compared with that of the one or more great systems which serve the larger part of the population. For this reason, while the average number of passengers per mile for all full-time electric surface railways without lighting plants in urban centers of more than 500,000 population was 446,527, only 13 of the 48 such companies had more than 400,000 fare passengers per mile of track. These 13 companies, however, operated 2,486.69 miles of track, or 52.7 per cent of the mileage for the entire group.

Only 4 of the 38 companies operating in urban centers of from 100,000 to 500,000 inhabitants showed more than 400,000 fare passengers per mile, and these

4 companies reported only 347.84 miles of track, or less than 10 per cent of the total for the entire group. On the other hand, 15 companies, with 45.6 per cent of the entire trackage of the group, fall within the limits of 200,000 to 300,000 fare passengers per mile of track. The average number of fare passengers for all full-time electric surface railways without lighting plants, in cities of this group, 277,509 per mile, thus corresponds fairly with the figures for a large proportion of the companies and the larger part of the trackage.

In cities of from 25,000 to 100,000 population there are no electric surface railways with more than 400,000 fare passengers per mile, and only 10 with more than 200,000, while 40 out of the 68 companies carried between 100,000 and 200,000 fare passengers per mile. Here again, then, the proportion for the larger number of companies corresponds broadly to the arithmetical average for the group as a whole, 150,739 passengers per mile.

Only 8 of the 168 full-time electric surface companies in urban centers of less than 25,000 population reported more than 200,000 fare passengers per mile of track, while 75 of the companies carried between 50,000 and 100,000 passengers per mile of track. The average for the entire group, 95,204, is thus seen to correspond fairly with the ratio of passengers to trackage in the case of a large proportion of the companies in the group. Much the larger proportion of interurban railways of both classes carried, in 1902, less than 100,000 passengers per mile of track, and a considerable number of companies in each of these groups reported less than 25,000 passengers per mile of track.

Further information in regard to the relation of density of traffic to population may be gained from the statistics for individual urban centers presented in Tables 13, 14, and 19.

Of the 8 centers of more than 500,000 population, 3 show more than 400,000 fare passengers per mile of track, and all but Baltimore show more than 300,000. Of the 24 urban centers of from 100,000 to 500,000 population, only 3 report less than 200,000 passengers per mile, and only 2 show more than 400,000. Of the 29 selected urban centers of from 25,000 to 100,000 population, 9 have less than 100,000 passengers per mile of track, and only 2 have more than 200,000. Of the 46 selected towns of less than 25,000 inhabitants, 27 show less than 100,000 passengers per mile of single track, and only 6 report more than 150,000.

Car mileage.—The figures showing the number of car miles run in urban centers of different sizes and on interurban railways (Tables 11 and 12), require no special comment. The relation of car mileage to trackage and to passengers carried is more significant, although comparisons between different population groups are rendered uncertain by the great difference in the size of cars. The proportion of car mileage to the length of track naturally increases, like the proportion of pas-

sengers to trackage, as the population of the area served increases. The number of car miles per mile of track for companies of all classes ranges from 28,840 in centers of less than 25,000 population to 104,554 in centers of more than 500,000 population. On interurban railways, particularly those of the fast, long class, larger cars are run than in cities, a fact which accounts, though of course only in part, for the smaller number of car miles per mile of track.

Passengers per car mile.—The average number of fare passengers per passenger-car mile on all street railways in urban centers of more than 500,000 inhabitants was 58 per cent more than the average for urban centers of less than 25,000, the figures being 4.87 and 3.07, respectively. For full-time electric surface railways, without commercial lighting, the largest urban centers show 4.92 fare passengers per passenger-car mile, and the smallest 3.26. Between the two extremes there is a steady gradation in the density of traffic per car mile.

Naturally these proportions do not show such wide differences between the groups of urban centers as appear in regard to density of traffic per mile of track, since the number of cars can be adjusted rather closely to the amount of patronage. It is probable that as between the largest cities and the smallest urban centers there is as great a difference in the average size of cars as in the number of passengers per car mile. The effect of this difference in size, however, is almost beyond question fully counteracted by the longer average rides of passengers in great cities. The statistics of passengers per car mile, therefore, seem to indicate that the cars are more generally crowded in large cities than in smaller towns, a point which is borne out by common observation. The ratio of passengers to car mileage on fast, long interurban railways as a group can not properly be compared with the similar ratios for urban lines.

Table 17 shows, by population groups, the number of full-time electric surface railway companies, without commercial lighting plants, reporting specified numbers of fare passengers per passenger-car mile.

When the relative length of track operated by each company is taken into account, the figures confirm in a general way the conclusion, drawn from the averages in Table 12, that the number of passengers per car mile is greater in the large urban centers than in the small ones and greater on urban lines than on interurban lines. While only 18 of the 48 companies in urban centers of more than 500,000 population report 4 or more passengers per car mile, these companies have 3,612.35 miles of track, or 77 per cent of the total mileage for the group. A detailed examination of the other data in Table 17 will show that the average number of passengers per car mile for all railways of this class, in the various other population groups, corresponds fairly well with the actual ratio reported by the greater number of companies in the respective groups.

TABLE 17.—Distribution of full-time electric surface railway companies without commercial lighting, in the various population groups, according to number of fare passengers carried per passenger-car mile: 1902.¹

PASSENGERS PER CAR MILE.	NUMBER OF COMPANIES.						
	Total.	Urban centers, population.				Interurban railways.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Total.....	568	48	38	68	168	42	204
Under 1.....	4	2				1	1
1 but under 2.....	83	4		4	24	21	30
2 but under 3.....	146	10	6	18	58	9	45
3 but under 4.....	174	14	16	18	47	5	74
4 but under 5.....	98	6	11	21	20	4	36
5 but under 6.....	41	5	5	6	11	2	12
6 but under 7.....	14	5		1	4		4
7 and over.....	8	2			4		2

¹ Exclusive of reports for 2 companies carrying freight only, and 2 companies which failed to furnish this information.

Mileage of freight, mail, express, and other miscellaneous cars.—For all classes of companies the greatest absolute mileage run by freight, mail, express, and other cars, including steam locomotives, as shown by Table 11, is found in urban centers of more than 500,000 population, the distance covered by such cars in these centers being 17,842,405 miles, or 3.4 per cent of the total of the car mileage for this group. Of this mileage 15,201,575 miles represent the distance traveled by steam locomotives on the elevated lines in New York and Brooklyn. The mileage of freight, mail, express, and other nonpassenger cars on street railways in urban centers of from 100,000 to 500,000 population and in urban centers of from 25,000 to 100,000 population is, in each case, less than 0.4 per cent of the total car mileage, and in centers of less than 25,000 inhabitants, less than 1 per cent. On fast, long interurban railways the mail, and still more, the freight and express traffic, are relatively much more important than on urban lines. The mileage run by other than passenger cars on such fast, long interurban railways was 3.7 per cent of their total car mileage in 1902, and on the other group of interurban railways 1.9 per cent of the total. A single company, however, the Old Colony Railway, of Massachusetts, contributed 700,927 of freight, mail, express, and other car miles, or more than one-fourth of the total for the sixth group.

Some idea of the complexity of the business of modern large street railway systems may be gained from the following classified presentation of the statistics of car mileage of two of the leading companies of New York, the Brooklyn Rapid Transit Company and the Manhattan Elevated Railway Company, for the year ending June 30, 1902. The Brooklyn system reports a much greater variety of cars, for the reasons that it operates both surface and elevated lines and that it keeps its records in greater detail than the Manhattan Company.

Detailed statistics of car mileage of Brooklyn Rapid Transit Company and Manhattan Railway Company.

CLASS OF CARS.	NUMBER OF CAR MILES.	
	Brooklyn Rapid Transit.	Manhattan (elevated) Railway.
Passenger cars:		
Revenue.....	52,684,980	44,631,618
Light (nonrevenue).....	951,549	440,125
Total.....	53,636,529	45,071,743
Miscellaneous cars:		
Freight.....	11,785	
Mail.....	163,635	
Express.....	169,662	
Foreign companies.....	21,798	
Flat.....	72,165	141,851
Wrecking.....	2,533	
Pay.....	12,065	6,788
School.....	42,626	
Ash.....	67,123	
Shop cars.....		23,174
Collectors and ticket cars.....		31,449
Sprinkling.....	2,240	
Snowplows and sweepers.....	2,305	
Sand.....	4,596	
Other.....	6,966	
Total.....	569,499	203,262
Engines (elevated):		
Revenue.....	3,386,394	10,191,148
Light (nonrevenue).....	538,728	935,792
Supply and miscellaneous.....	58,616	90,897
Total.....	3,983,738	11,217,837
Total mileage of all sorts.....	58,189,766	56,492,842

A conspicuous feature of these statistics is the large amount of mileage of passenger cars and of locomotives in passenger service on the elevated lines from which no direct revenue is derived. Such "light" mileage occurs chiefly in the switching of cars, in running cars to the barns or terminals after their day's service is completed, and in taking the additional cars required during the rush hours to and from the part of the line where they are needed. The mileage of "light" cars is included in the passenger-car mileage in the general tables. The school cars mentioned are used for the instruction of motormen. The ash cars carry away the ashes from locomotives and from power-plant boilers. Flat cars and working cars of other sorts are used in conveying coal and other operating supplies and in construction and repair work.

Car hours.—The incompleteness of the returns of car hours makes it impossible to present an accurate comparison of the different groups of urban centers as regards the number of fare passengers carried per car hour operated. Some idea of the relative density of traffic as thus measured may be gained, however, from the statistics for selected companies. Of important surface railways in urban centers of more than 500,000 inhabitants only five keep records of car hours, three of these being in Chicago, one in Boston, and one in St. Louis. The number of passengers per car hour ranges from 26.99 for the Consolidated Traction Company, of Chicago, Ill., to 41.04 for the St. Louis Transit Company, of St. Louis, Mo. Fourteen of the leading railways in urban centers of from 100,000 to 500,000.

population present these statistics, and with them the number of passengers per car hour ranges, on the face of their returns, from 12.62 for the Louisville Railway Company, of Louisville, Ky., to 64.34 for the St. Joseph Railway, Light, Heat, and Power Company, of St. Joseph, Mo. The figures for the other reporting companies in this group vary between 24.94 and 45.97. Fifteen of the selected companies—Table 13—in centers of from 25,000 to 100,000 population, and twenty of the selected companies—Table 14—in centers of less than 25,000 population also reported car-hour figures. For all electric surface companies reporting car hours in the first two groups of urban centers and for the selected companies in the other two urban groups the average numbers of passengers per car hour were re-

spectively as follows: In urban centers of more than 500,000 inhabitants, 39.96; in centers of 100,000 to 500,000 inhabitants, 31.35; in centers of from 25,000 to 100,000 inhabitants, 25.42; in centers of less than 25,000 inhabitants, 24.04. The ratio of fare passengers to car hours appears, therefore, to increase regularly with increasing population.

Accidents.—The following table shows for all street railways, and separately for all full-time electric surface railways (including those with commercial lighting) classified according to population of the urban centers served, the number of persons killed and injured during the census year 1902, and the proportion which fatal accidents bear to car mileage:

TABLE 18.—ACCIDENTS ON RAILWAYS, CLASSIFIED ACCORDING TO POPULATION: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
All street railways:							
Persons killed	11,217	491	221	124	189	90	202
Persons injured	47,429	18,269	19,518	3,109	632	1,481	4,400
Number of car miles run to each person killed	940,370	1,064,468	1,069,424	933,676	721,234	523,092	762,228
Electric surface full-time railways:							
Persons killed	11,164	460	220	119	187	85	193
Persons injured	46,988	18,117	19,443	3,054	611	1,414	4,299
Number of car miles run to each person killed	892,475	944,333	1,060,480	934,998	695,140	516,448	782,914

¹ This number does not include one fatal accident on a railway not reporting car mileage. See also notes to Table 8.

While according to the returns more than twice as many persons were killed on street railways in urban centers of over 500,000 population as on those in centers of from 100,000 to 500,000 population, the number of injured reported was actually smaller. In the absence of detailed knowledge of local conditions, it is impossible to present any sufficient explanation of this wide discrepancy. It may be due in some measure to differences in the degree of completeness with which returns of injuries are made.

Taking the average for all railways, 940,370 car miles were run to each person killed. The risk of fatal accident was apparently least in cities of from 100,000 to 500,000 population. That it was somewhat greater in the largest urban centers than in urban centers of from 100,000 to 500,000 population is perhaps due to the greater crowding of the streets. The fact that the proportion of fatal accidents to car mileage was in 1902 higher in cities of 25,000 to 100,000 than in the larger cities, and still higher in cities of less than 25,000 population, is not readily explicable. There remains a large element of doubt as to whether the figures reported for the single year are typical of general conditions.

As might have been expected, the risk of fatal accidents was apparently considerably higher on fast, long interurban railways than elsewhere, one person being killed to each 523,092 car miles operated by such railways. The high speed maintained by interurban cars, combined with the inadequate protection of crossings and the often imperfect signaling devices, serve to explain, at least in part, this high proportion of fatal accidents.

III.

TRAFFIC AND TRUCKAGE IN SELECTED URBAN CENTERS.

A more vivid picture of street railway conditions, and of the development which has taken place between the two census periods, can be obtained from the data for individual cities than can be gained from averages. Table 19 shows for 1890 and 1902 the length of track, the number of passengers carried, and the car mileage of street railways in each urban center having in 1900 more than 100,000 population. It shows also the relation of traffic to population at the two census periods and, for 1902 only, the ratio of passengers carried to trackage and to car mileage.

STREET AND ELECTRIC RAILWAYS.

TABLE 19.—TRACKAGE AND TRAFFIC IN URBAN CENTERS OF 100,000 POPULATION AND OVER: 1902 AND 1890.

URBAN CENTER.	POPULATION.		MILES OF TRACK.		MILES OF TRACK PER 1,000 POPULATION.		FARE PASSENGERS CARRIED.		PASSENGERS PER INHABITANT.		PASSENGERS PER MILE OF TRACK.		PASSENGER-CAR MILES.	PASSENGERS PER CAR MILE.
	1902 ¹	1890	1902	1890	1902	1890	1902	1890	1902	1890	1902	1890	1902	1902
Albany, Troy, Rensselaer, N. Y.	216,530	207,306	75.83	58.57	0.35	0.28	26,417,076	11,197,414	122	54	348,372	191,180	7,449,410	3.5
Baltimore, Ellicott City, Md.	510,288	435,887	365.12	156.55	.72	.36	96,763,878	40,659,982	190	93	265,019	259,725	23,330,292	4.1
Boston, Cambridge, Chelsea, Everett, Malden, Newton, Somerville, Brookline, Waltham, Mass.	927,994	704,768	451.68	271.94	.49	.38	228,179,308	116,646,338	246	166	505,179	428,941	47,524,724	4.8
Buffalo, Niagara Falls, Lockport, North Tonawanda, N. Y.	421,694	302,373	320.48	72.27	.76	.24	74,136,881	17,244,388	176	57	231,331	238,611	17,290,756	4.3
Chicago, Ill.; Hammond, Ind.	1,769,951	1,136,846	1,036.24	390.33	.58	.34	410,284,094	180,326,470	232	159	395,935	461,985	102,366,407	4.0
Cincinnati, Ohio; Newport, Covington, Ky.	429,137	370,850	263.57	147.80	.61	.40	86,208,384	41,440,045	201	112	327,080	280,379	23,940,175	3.6
Cleveland, Ohio, and vicinity.	405,359	264,114	237.04	158.88	.58	.60	81,370,202	39,164,773	201	148	343,276	246,505	18,768,515	4.3
Columbus, Ohio, and vicinity.	127,022	89,479	106.43	34.75	.84	.39	26,489,927	8,202,662	208	92	248,895	236,048	5,619,476	4.7
Denver, Colo.	133,859	106,713	149.77	130.75	1.12	1.22	31,085,443	21,535,735	232	202	207,554	164,709	6,458,908	4.8
Indianapolis, Ind.	169,164	105,436	109.86	70.00	.65	.66	30,005,026	9,863,000	177	94	273,120	140,900	6,921,490	4.3
Jersey City, Elizabeth, Hoboken, Paterson, Passaic, Newark, Bayonne, Orange, N. J.	969,736	666,389	463.54	178.59	.48	.27	148,094,623	47,039,699	153	70	314,639	263,395	24,589,773	6.0
Kansas City, Independence, Mo.; Kansas City, Argentine, Rosedale, Kans.	237,042	188,573	181.24	143.08	.76	.76	57,148,083	41,669,894	241	221	315,317	291,235	15,979,864	3.6
Los Angeles, Pasadena, Santa Ana, Orange, Cal.	118,746	60,394	164.16	144.79	1.38	2.40	30,803,086	10,524,966	259	174	187,641	72,691	9,533,269	3.2
Louisville, Ky.	204,731	161,129	147.13	128.00	.72	.79	34,503,388	21,281,584	168	132	234,510	166,262	9,566,844	3.6
Memphis, Tenn.	102,981	64,634	71.88	46.00	.70	.71	16,598,823	4,300,000	161	66	230,924	93,478	3,653,631	4.5
Milwaukee, Whitefish Bay, Watertown, Wis.	301,701	212,557	146.50	97.06	.48	.46	46,974,373	14,512,156	156	68	322,848	149,517	9,143,023	5.1
Minneapolis, St. Paul, Stillwater, Minn.	378,923	309,841	251.02	156.79	.66	.51	63,009,957	26,357,532	166	85	251,016	165,990	12,895,343	4.9
New Orleans, La.	287,104	242,039	180.31	153.14	.63	.63	53,184,273	30,510,662	185	126	294,960	199,234	17,810,169	3.0
New York, Yonkers, White Plains, Mt. Vernon, New Rochelle, Pelham, N. Y.	3,548,096	2,564,403	1,299.10	775.78	.37	.30	943,687,316	600,413,862	266	234	726,416	773,949	180,499,539	5.2
Oakland, Alameda, Berkeley, Hayward, Emeryville, Cal.	101,872	66,595	122.80	17.98	1.20	.27	17,247,022	2,807,956	169	42	140,448	156,171	5,449,713	3.2
Omaha, South Omaha, Dundee, Nebr.; Council Bluffs, Iowa.	155,268	169,988	106.95	119.03	.68	.70	21,418,791	13,613,283	138	80	202,159	114,368	6,373,697	3.4
Philadelphia, Pa.	1,293,697	1,046,964	517.53	351.12	.40	.34	331,304,685	165,117,627	256	158	640,165	470,260	61,175,495	5.4
Pittsburg, Allegheny, McKeesport, Bellevue, Sharpsburg, McKees Rocks, Carnegie, Wilkesburg, Braddock, Homestead, Connellsville, Uniontown, Pa.	640,380	423,005	469.47	113.32	.73	.26	168,632,339	46,299,227	263	108	359,197	408,571	34,311,111	4.9
Providence, Pawtucket, R. I.	268,946	205,923	137.05	59.48	.51	.29	45,163,704	18,478,722	168	90	329,542	310,587	8,016,662	5.6
Rochester, Irondequoit, N. Y.	178,333	148,899	96.86	62.17	.54	.42	20,171,260	11,372,596	113	76	210,424	182,927	5,196,819	3.9
St. Joseph, Mo.	102,979	52,324	35.15	22.88	.34	.44	8,534,278	2,014,868	83	38	242,796	88,062	2,198,630	3.9
St. Louis, Mo.; East St. Louis, Granite, Ill.	614,328	468,087	396.21	169.22	.64	.36	129,596,027	63,299,479	211	135	327,089	374,066	31,014,097	4.2
San Francisco, San Mateo, Cal.	344,614	298,997	276.50	156.22	.80	.52	117,357,877	80,619,005	340	270	424,441	516,061	20,553,252	5.7
Scranton, Dunmore, Olyphant, Jermyn, Carbondale, Pa.	155,655	112,385	76.68	30.00	.49	.27	8,331,663	3,023,493	54	27	108,655	100,783	2,322,162	3.6
Syracuse, Onondaga, Geddes, De Witt, N. Y.	123,776	99,409	68.16	44.13	.55	.44	14,234,508	6,437,197	115	65	208,840	145,869	3,704,195	3.8
Toledo, Ohio	135,271	85,506	97.78	42.00	.72	.49	20,104,076	5,656,813	149	66	205,605	134,686	5,517,484	3.6
Washington, D. C.	279,940	231,901	139.67	83.00	.50	.36	63,829,752	31,032,187	228	134	457,004	373,882	15,577,212	4.1

¹ Population shown for 1902 is that reported at the census of 1900.

As most of the cities increased materially in population during the two years between the 1900 census of population and that of street railways, the apparent increase in the proportion of trackage and traffic to population since 1890 is somewhat exaggerated.

The method of selecting the areas which should be considered as a single urban center in preparing this table has been described in Part I, Chapter I. Attention was there called to the fact that, because of the complications arising where urban railways extend into rural districts, or where part of the strictly urban traffic is carried by railways that are primarily interurban, comparisons between cities in respect to the proportions which trackage and traffic bear to population are not exact. Nevertheless, except with regard to two or three cities which have been omitted from the table, the data, especially those showing traffic, are not sufficiently affected by these complications to vitiate conclusions.

Relation of trackage to population.—In 1890 the development of street railway service, as shown by the amount of trackage constructed, varied widely in dif-

ferent cities. In a few urban centers new electric systems had recently been installed and trackage had increased considerably, but in other cities the limits of the horse railway had not yet been escaped. During the interval between the two census periods most of the cities which had been more backward in street railway enterprise made a rapid advance, so that at present the proportion of trackage to population is more nearly uniform than it was in 1890. Some of the urban centers, therefore, show a great increase in the length of track per 1,000 inhabitants since 1890, while others show little increase, and 8 of the 32 cities even show a decrease, which, however, with a single exception, is slight.

The extension of the leading railway system of Buffalo, N. Y., to Lockport and Niagara Falls, N. Y., and other neighboring places, accounts in part for the conspicuous increase in the ratio of trackage to population in that urban center. Similar suburban and interurban extensions also explain in large measure the marked addition to trackage in the great iron and steel center

of which Pittsburg, Pa., is the leading city, and in Oakland, Cal., and vicinity.

In two of the very largest cities, New York and Philadelphia, the rate of increase in trackage since 1890 has been only about one-fifth greater than that in population. This is primarily because the tremendous demand for rapid transit in these cities had forced a greater development of street railways even in 1890 than was found in many of the less densely populated urban centers. In Chicago, however, the proportion of trackage to inhabitants increased about 70 per cent during the interval between the two census periods. The only urban center which shows a conspicuous decline in the proportion of trackage to population since 1890 is that of Los Angeles, Cal., and the neighboring municipalities. In 1890 there were no less than 2.4 miles of track for each 1,000 inhabitants in that center, a much greater proportion than was found in any other. This extreme development was doubtless attributable in part to the boom then prevailing in southern California. Street railways were built partly in the expectation that great cities would grow up throughout the section, and partly with the purpose of facilitating the sale of real estate. The street railways of this urban area carried three times as many passengers in 1902 as in 1890, but their trackage had increased by only one-seventh, while the population had nearly doubled.

In comparing the different urban centers at the present time it may be observed that length of track is a less accurate measure of street railway development than the number of passengers carried or the car mileage operated. The amount of track required to serve adequately the needs of the people depends largely on the density of population and the topographical conditions of the city. Thus, largely because of the dense population in New York city, the proportion of trackage to population there is lower than in any other urban area except Albany and Troy, N. Y., and St. Joseph, Mo. Philadelphia and Boston also show considerably less track per 1,000 inhabitants than most of the smaller cities. The population of Chicago is more scattered than that of the large cities just named, and it has, therefore, a larger proportion of trackage to population. The greatest length of street railway track per 1,000 of population is found in the western cities, Denver, Colo., and Oakland and Los Angeles, Cal. This is explained by their scattered population and also by the fact that the companies operating there have a considerable suburban and interurban trackage.

Relation of traffic to population.—While many urban centers of more than 100,000 inhabitants show little increase, and some show an actual decrease, in the ratio of trackage to inhabitants since 1890, there is no center in which the proportion of street railway passengers to inhabitants has not increased, and there are few in which the increase has not been a large one.

The slowness of the increase in the proportion of

passengers to population in New York city is in part explained in another part of this report (see pages 31 to 38 *passim*). Up to the present time the railways of that city have not been able fully to meet the demand for transportation. In a few other cities in which street railway traffic was most fully developed in 1890 the increase in the proportion of passengers to inhabitants also has been slight. Denver, Colo., and Kansas City, Mo., are conspicuous instances.

On the other hand, Baltimore, Philadelphia, Boston, Chicago, and Pittsburg-Allegheny, among urban centers of more than 500,000 population, show a very marked increase in the proportion of passengers to inhabitants. In 1890 a large part of the railway systems of Chicago, Pittsburg, and Philadelphia was still operated by horsepower. The subsequent increase in traffic is, therefore, partly due to the superior convenience of electric traction. The number of rides per inhabitant in Pittsburg and vicinity was 108 in 1890 and 263 in 1902. Another illustration of the increase in traffic that has followed the introduction of electricity is seen in Baltimore, where in 1890, with a system confined almost entirely to horse cars, there were but 93 passengers per inhabitant, while in 1902, the system having become entirely electric, 190 rides per inhabitant were reported. Several smaller cities, which were almost wholly dependent on horse cars in 1890, also present very marked increases in the density of traffic. Altogether there are 12 out of the 32 centers in which the proportion of passengers to population doubled between 1890 and 1902.

Other conditions being equal, the extent to which the people of a city will patronize its street railways will depend largely on the size of the city. This is borne out by the figures in Table 19. The rank of the cities in 1902, as regards the ratio of passengers to inhabitants, bears a rough parallelism to their rank in population. Other factors, however, also influence the relative amount of street railway traffic, among which are the shape and general topographical features of the city, especially the presence or absence of hills; the density of population per unit of area; and the situation of the business sections with reference to the residence sections. The average wealth of the masses of the people and their habits and customs of life also affect their patronage of the street railways.

Of the 8 urban centers of more than 500,000 population, 7 show little difference in the degree of street railway patronage, the range being only from 190 to 266 rides per inhabitant. The eighth of the urban centers of this class, showing only 150 rides per inhabitant, consists of the neighboring cities of northern New Jersey and differs from the others in material characteristics.

San Francisco, though falling in the second group of urban centers, has by far the largest ratio of street railway rides to inhabitants. On the average, each inhabitant of that city took about one ride per day during 1902. The city abounds in steep hills, and the manu-

facturing and commercial interests are mostly centralized within a small area, while the residence section is extensive and comparatively thinly populated.

Among the centers of less than 500,000 population, Los Angeles, Cal., Kansas City, Mo., and Washington, D. C., follow San Francisco in the ratio of passengers to inhabitants. The patronage of street railways is least per inhabitant in the Scranton, Pa., center. The low ratio is probably due to the fact that the patronage comes largely from a mining population, with a low average of per capita wealth and with residences near the place of work. St. Joseph, Mo., Rochester, and Albany-Troy, N. Y., are also conspicuous for the small degree of street railway patronage.

Passengers per mile of track.—The column in Table 19 indicating the number of passengers carried per mile of track in the largest urban centers needs little comment.

With seven exceptions the number of passengers carried per mile of track in these 32 urban centers has increased since 1890, and despite the fact that the average ride in practically all of the cities has doubtless lengthened materially during this period. The decline in the density of traffic per mile of track in Buffalo, New York city, Chicago, Pittsburg, St. Louis, San Francisco, and Oakland is attributable to the extension of railways into thinly populated parts of these cities and into suburban and rural districts where traffic is comparatively light. Beyond question in these, as in other cities, the traffic upon tracks which were already built in 1890 has increased since that time. If attention be confined to those cities in which the increase in trackage since 1890 has been relatively slight, a very great increase in the ratio of passengers to trackage appears in nearly every case. Thus, of the 12 urban centers named in Table 19, in which the length of track per 1,000 inhabitants did not increase more than one-fifth between 1890 and 1902, 4—Los Angeles, Cal., Memphis, Tenn., Milwaukee, Wis., and St. Joseph, Mo.—more than doubled the number of passengers per mile of track; 4 others—Indianapolis, Ind., Louisville, Ky., New Orleans, La., and Omaha, Nebr.—show an increase of more than 40 per cent; and 3 others—Denver, Colo., Cleveland, Ohio, and Philadelphia, Pa.—show an increase of between 25 and 40 per cent. In New York city the number of passengers per mile is 726,416, and in Philadelphia, 640,165, while Boston, San Francisco, and Washington are the other cities which report more than 400,000 passengers per mile. The ratio is least in Los Angeles and Oakland, Cal., because of their extensive suburban lines, and in Scranton, Pennsylvania.

A comparison of these statistics for individual cities in 1902 bears out in a general way the opinion that the larger the city the greater tends to be the number of passengers who will be carried per unit of track, but many other influences also enter in and often counteract that of population.

Passengers per car mile.—Because of differences in the size of cars and in the average length of rides a bare comparison of the number of car miles operated in the different individual cities and of the number of passengers per car mile is much less instructive than the other comparisons thus far presented. It is impossible, from the statistics, to trace any connection between the size of the city and the number of passengers carried per car mile. The highest ratio of passengers to car mileage is reported from the great urban center in northern New Jersey, of which Jersey City, Newark, and Paterson are the most important constituents; yet this center, as has been explained, was the only one of the eight centers having a population severally of 500,000 and over that showed a ratio of passengers per inhabitant below 190. Other cities showing more than five passengers per car mile are, in the order named, San Francisco, Providence, Philadelphia, New York, and Milwaukee. The lowest ratio of passengers per car mile, that of New Orleans, was 3, while that of both Los Angeles and Oakland was 3.2.

Statistics of the relation of passengers and trackage to population, for selected cities and towns of from 25,000 to 100,000 inhabitants and of less than 25,000 inhabitants, respectively, are to be found in Tables 13 and 14.

IV.

THE URBAN STREET RAILWAY AS A SOCIAL FACTOR.

The enormous movement of human beings on the street railways shown by the statistics must evidently constitute a factor of great importance in the social and economic life of the people. The social service of the street railways in the largest cities is so much more fundamental in importance than in smaller towns that it deserves special consideration. It is chiefly to such cities that attention is now directed. The benefits which have resulted from the recent development of interurban and rural electric railways are more fully discussed in Part I, Chapter VII.

Distribution of urban population by street railways.—The chief function of the street railway in a great city is the distribution of the population over a wider area than it would otherwise be possible to occupy. Economic and social forces tend powerfully to draw multitudes of people into huge urban communities, and as the inhabitants increase in numbers, they must either crowd ever closer and closer together, to the detriment of health and comfort, or they must find some means by which, without intolerable waste of time and strength, they may live farther from one another and from their places of business. The introduction of street railways in large cities, as well as the extension of their tracks and every improvement in respect to speed and comfort, came in response to an imperative social need. The relation between such improvements in street railway service and the demand for them is, of course, a recip-

rocal one. Had not the enterprise of street railway managers offered the opportunity for the wider distribution of population, the people would not have realized fully the unsatisfactory character of their housing conditions.

As more fully shown hereafter, a constant increase in the density of population, even since the introduction of street railways, has taken place in certain of the older crowded quarters of our great urban centers which continue to be used for residence purposes. But the fact is significant that a large majority of urban inhabitants have escaped the necessity of living in these crowded quarters. The occupied area of cities has extended steadily and rapidly. It is not true that the street railway has been the sole cause of this extension. To some extent it has been due to the establishment of manufacturing and commercial enterprises in the outlying parts of cities. The street railway, however, has been probably the most important single influence in dispersing urban population. The greater part of the breadwinners in the outlying sections of our largest cities are people who must rely upon street railways as a means of going to and from their places of daily employment.

The influence of the street railway in the distribution of urban population is often concretely illustrated by the manner in which the residence sections have followed the lines of the railways. In many cases the boundaries of the built-up area of a city, instead of being fairly uniform, consist of long fingers or tentacles reaching out from the more solid center, each owing its growth to a radiating street railway.

A few illustrations of the manner in which the outer areas of cities have increased in population during the decade from 1890 to 1900 will serve to indicate the influence of the street railway, particularly since the greatest development of street railway service has taken place during this decade. In the following discussion, where comparative statistics for the population of city wards or other areas are given, the area covered is the same in 1900 as in 1890, account having been taken of changes in boundaries.

The population of Manhattan borough of New York city grew from 1,441,216 in 1890 to 1,850,093 in 1900, an increase of 408,877. Of this increase, 231,556, or considerably more than one-half, took place in the Twelfth ward alone, the population of that ward having practically doubled during the decade. This ward comprises that part of Manhattan Island lying north of Eighty-sixth street, which is approximately 7 miles from the southern extremity of the city. The great majority of the breadwinners of this ward do business elsewhere and make daily use of the street railways.

The population of Bronx borough, which lies northeast of the Harlem and even more distant from the business center of the city than the thickly settled part of the Twelfth ward, increased from 88,908 in 1890 to 200,507

in 1900. Without surface and elevated railways but a small fraction of this great addition to the population above the Harlem would have been possible. The manner in which the street railways have affected the growth of this borough may be understood by observing how the dwellings have followed the lines of the elevated railway and the Third avenue surface system.

The borough of Brooklyn, a large part of whose breadwinners find their employment either in Manhattan or in parts of Brooklyn which are reached from the residential sections only by street railways, shows a much more rapid growth in population than Manhattan. During the decade between the last two censuses the inhabitants increased from 838,547 to 1,166,582, or about 39 per cent, as compared with about 28 per cent for Manhattan borough. Much the greater part of this addition to the population of Brooklyn has taken place in the outlying wards. Thus the extensive wards numbered 8, 18, 22, 24, and 26, in 1890, together with the still more distant wards known at that date as Flatbush, New Utrecht, Gravesend, and Flatlands, advanced in population from 234,929 in 1890 to 455,264 in 1900, the increase amounting to more than two-thirds of the total increase of the population of Brooklyn. While the population of these outlying wards nearly doubled during the decade, that of the remaining 21 wards increased only 18 per cent. The transportation facilities of even the most distant residential sections of Brooklyn are almost wholly confined to the electric surface and elevated railways.

The borough of Queens shows an even more remarkable increase of population than Brooklyn, the inhabitants numbering 87,050 in 1890 and 152,999 in 1900 and the increase has been largely in the more distant and thinly populated wards, which are largely occupied by people doing business far from their homes. Thus the ward known as Jamaica shows an increase from 14,441 to 30,761, and Newtown an increase from 17,549 to 40,903. The transportation facilities of these sections are, in part, furnished by steam railways, but it is believed that the electric surface and elevated lines carry the greater proportion of the traffic. There has been a marked increase in the street railway facilities of these wards in recent years. Indeed, a detailed examination of the maps of both Brooklyn and Queens boroughs shows distinctly that the extension of population has largely been determined by the location of such railways.

The city of Boston, with the immediately adjacent cities of Somerville, Cambridge, and Chelsea, and the town of Brookline, furnish another conspicuous illustration of the influence of electric railways in distributing population. Of the seven wards lying nearest to the business center of Boston, five showed a decrease in population from 1890 to 1900; although in the Sixth and Eighth wards, which are largely occupied by the poorest immigrant classes, there was an

increase from 31,473 to 40,085. The Eleventh and Seventeenth wards, which lie next to these central wards, added only moderately to their population, and the same is true of the three wards across the Charles river in Charlestown. On the other hand, the Eighteenth, Twentieth, Twenty-first, Twenty-second, Twenty-third, Twenty-fourth, and Twenty-fifth wards, which are farthest from the center of the city toward the southwest, increased in population from 149,978 in 1890 to 243,373 in 1900. The increase of 93,395 inhabitants in these outlying wards was nearly five-sixths of the total increase for the city of Boston. The Twenty-fourth ward, whose nearest boundary is several miles from the business center of the city, increased in population from 29,638 to 61,676. During the interval between the two censuses, moreover, the population of Cambridge, Somerville, Chelsea, and Brookline increased from 150,192 to 207,536, or much more rapidly than that of the older parts of Boston. A very considerable proportion of the breadwinners, both of the outlying wards of Boston and of the adjacent cities mentioned, are employed in the business district of Boston and depend for transportation upon the electric railways.

The change in the distribution of the population of Philadelphia since 1890 has been no less remarkable. Almost all of the wards in the heart of the city show a decrease in population, while several of the large outlying wards to the west and north of the business center have added greatly to the number of their inhabitants. Thus Ward 34, which lies west of the Schuylkill and comprises a part of what is known as West Philadelphia, increased from 23,721 in 1890 to 43,706 in 1900. Wards 28, 37, and 38 (which constituted one ward in 1890) situated to the northwest of the business center, increased from 46,390 to 99,480, and the adjoining Ward 33 increased from 33,171 to 65,372. At their nearest boundary these last-mentioned wards are nearly 3 miles from the city hall, and they extend to a distance of more than 4 miles from that point.

Chicago also shows the influence of railways in scattering population. It is scarcely necessary, however, to present additional statistics to illustrate this movement in the largest cities. But even cities of the second class have experienced a similar tendency toward the pushing of their population into the outlying districts. Thus the inhabitants of that part of the city of Cleveland which was included within city limits in 1890 increased from 261,353 in that year to 356,923 in 1900. Of this gain of 95,570, more than two-thirds took place in the wards 18 to 27, inclusive, the population of which increased from 83,349 to 148,857. These wards lie in a double row along the eastern and southeastern boundary of the city. They are at no point less than 2½ miles from the business center of Cleveland, and they extend to a distance of about 6 miles from that center.

Street railways not only help to prevent excessive crowding of urban population, but in most cities they even aid a large fraction of the people in continuing the practice, so characteristically American, of living in independent houses instead of in tenements. This is true even in such large cities as Philadelphia, Chicago, and Boston, a thing which would be obviously impossible if the occupied territory were as contracted as it would have to be in the absence of the railways. The social advantages of the individual dwelling house need no emphasis. The street railway likewise aids in such a spreading of the population of many of our medium-sized cities—such, for instance, as Buffalo, Detroit, and Cleveland—as to permit a large proportion of the dwellings to be detached structures with open yards, which add greatly to the health and pleasure of the people.

In still smaller towns the street railway becomes less essential as a means of dispersing population. As might be expected, the proportion of railway rides to inhabitants is much less in such places than in great cities. Even here, however, the same function of the electric railway manifests itself to some extent as one of the influences that makes possible houses with large yards and placed in the most pleasant situations. The demand for street railway service in such towns varies greatly with local topographical conditions. Sometimes these conditions, or other causes, dictate that industrial establishments shall be situated at some distance from the most desirable residence sites. Sometimes a town is shut into a narrow valley, or confined along the borders of a river, so that the expansion of population must be chiefly in one direction. In either of these cases, more demand for street railway transportation will be found than in a compact town of equal population. For these and other reasons, it is impossible to generalize with regard to the extent of the patronage which street railways may expect in places of small size. Many of the railways which serve towns of this sort find it necessary to seek interurban business as well.

Influence of electric railways on suburbs.—The electric railway has given a powerful impetus to suburban life in the vicinity of our large municipalities. Prior to its advent the suburban dweller was confined to the steam railway as a means of transportation. Suburbs were, of necessity, situated chiefly along the lines of the great through railways, since it would not usually prove profitable to construct a local steam line primarily for suburban traffic. The electric railway has not by any means wholly superseded the steam road as a means of transportation for suburban residents, but a large proportion of the suburbs which were formerly accessible only by steam roads are now served also by electric lines, while many new suburbs have been created by the extension of electric railways. The possible area for suburban life has thus been increased and the way opened to many favorable sites which were

previously inaccessible. The relative advantages of the street railway and the steam railway for suburban traffic differ in different cases. On account of having its own right of way, the steam railway can run its trains faster within the limits of the closely built area of the city than can most electric railways, which traverse the public streets. Even outside of the closely built area, the speed of the steam train is at present greater than that of most suburban electric cars. The electric railway has counter advantages. Its cars run much more frequently (which may more than offset any advantage of the steam railway in regard to speed); it is free from smoke, and, more important still, it can usually carry the suburban passenger more nearly to the precise point which he desires to reach. The steam railway has at most but a few stations within the city limits, and its nearest station is often a considerable distance from the business center of the city.

The census of 1900 shows a very marked increase in the suburban population in the vicinity of our great cities since 1890. To be sure, the growth of suburbs has in most instances been no faster than that within the limits of the city. In considering this fact, however, it should be noted that the limits of several of our great cities are so extensive that a considerable number of the inhabitants in their outskirts are living under an approach toward suburban conditions. Since a large fraction of the addition to the population of such cities is in these outlying districts, it is not proper to judge of the relative importance of the growth of suburbs by comparing the population of the villages outside the city limits with the total population inside.

Urban centers differ materially from one another in the degree to which the growth of their suburbs has been aided by the electric railway. On account of the great geographic areas within the limits of New York city and Chicago it is probable that the larger part of the passenger traffic between these cities and the suburban villages outside their boundaries is at present carried by steam railways. Electric suburban service is about to be introduced on the leading steam railways entering New York city, and new exclusively electric lines for fast suburban service have been recently built or are planned in both Chicago and New York. Boston illustrates more clearly the influence of the electric railway. Several of Boston's residential suburbs, the people of which patronize the trolley railway much more than the steam lines, show marked increases in population since 1890. Thus the population of Newton rose from 24,379 in that year to 33,587 in 1900; that of Hyde Park from 10,193 to 13,244; that of Medford from 11,079 to 18,244; and that of Arlington from 5,629 to 8,603. The population of several other residential suburbs increased in similar proportions. Philadelphia is another city whose suburbs are served largely by electric railways, and their population has considerably increased since 1890. The population of St. Louis

county, Mo., which adjoins the city of St. Louis, increased from 36,307 in 1890 to 50,040 in 1900; that of Milwaukee county, Wis., outside the city of Milwaukee, from 28,500 to 44,702; and that of comparable areas of Cuyahoga county, Ohio, outside the city of Cleveland (the city limits having been extended during the decade), from 34,522 to 57,352. The traffic of the suburbs of all three of these cities is, in considerable measure, carried by electric railways.

Effect of street railways in concentrating business.—The presence of a rapid and cheap means of passenger transportation permits the manufacturing establishments, and still more the commercial establishments of a city to be located in a manner which will be most convenient and economical for themselves and their patrons. With regard to retail and wholesale trade, and to office business, there is a great economic advantage in concentration in specialized centers. The same is true in varying degree of many classes of manufacturing concerns. It is often advantageous to have those of the same character near together, or even to have the entire manufacturing business of a city concentrated in one district. Without effective methods of transporting passengers, such concentration could not have been accomplished to the same extent.

A conspicuous illustration of the advantages of local concentration in business is found in the retail sections of our great cities. By means of the street railway, customers from all parts of the city are able to come to a common center where they find huge stocks, wide variety, and effective competition, all of which would have been largely lacking had they been compelled to patronize small local concerns within walking distance from their homes. The large scale on which retail business in cities is now conducted, with its resultant economies, would not have been possible in any such degree without the opportunity of bringing widely separated customers to a single shopping section. The department store could never have attained its present importance except through the aid of the street railway.

There are no satisfactory statistics regarding the degree to which the business of cities has become concentrated in narrow areas. Mr. B. J. Arnold, in his report on the Chicago Transportation Problem, presented to the city council toward the end of 1902, estimated the daily movement of people into the central section of Chicago, by means of the surface street railways alone, at about 225,000. He assumed that 20 per cent of the total surface railway traffic was carried by cross town lines which did not reach the business center, but that only 25 per cent of the trunk-line traffic consisted of short rides, the remainder representing travel to and from the business center. A still larger proportion of the traffic on the elevated railways, which carry more than a fourth of the city's passengers, was to and from the same center, which has an area of scarcely more than a square mile. It has been estimated

that the day population of Manhattan Island below Canal street is about half a million greater than the night population, and a large proportion of this enormous number of persons is brought thither by street railways.

Effect of street railways on land values and rents.—Closely connected with the influence of the street railway in spreading out the residential sections and concentrating the business sections of cities is its influence upon the values of land and upon rents. Every extension of a railway line into new territory increases the selling and rental value of the real estate in the vicinity. In numerous cases real estate syndicates have built railways for the purpose of rendering their lands accessible to the people and increasing their price. This was conspicuously true during the "booms" in the Western states.

While the street railway is thus a creator of land values in certain sections, it sometimes helps to destroy them in other sections by making it possible for the population and business to move elsewhere. Broadly speaking, the railways tend to distribute and equalize land values in the residential parts of cities and to prevent the excessive rents in certain sections which would follow from overcrowding. On the other hand, the street railway tends to increase land values in those sections of a city which become specialized as centers of industry and trade.

Relation of street railways to the social life and recreations of the people.—The street railway has done much to increase the opportunities of city dwellers for enjoyment and improvement. To a large proportion of the city population it is the usual conveyance employed in making social calls and carrying on other forms of social intercourse. The distances which must be covered for these purposes in large cities are so great that social intercourse would be very much restricted without cheap and rapid transit. Again, the street railway enables thousands to attend theaters, music and lecture halls, and other places of entertainment and instruction, who would otherwise either be excluded altogether, or be compelled to confine their patronage to establishments of a neighborhood character which could not offer such attractions as are now readily accessible.

More important is the social service rendered by street railways in carrying the people from the crowded parts of cities to places of outdoor recreation and amusement. The public parks of our municipalities find their usefulness immensely enhanced by the cheap and easy means of access afforded by street railways. The large country parks which have recently been opened at some distance from the closely built areas of Boston, New York, and several other great cities, depend almost wholly on this means of transportation for their patronage. In this connection it may be suggested that the restriction of urban land values which is so largely due to the influence of street railways, has

made it possible for cities to set aside parks even within their more closely populated areas. Bathing beaches, race tracks, ball grounds, and private amusement and recreation parks of all sorts owe their accessibility in no small measure to the electric railway. A very considerable proportion of the people of our large cities obtain numerous outings in the evenings or on holidays and Sundays, which would be impossible without the aid of this form of transportation. While the forms of recreation thus obtained are not always of a high character, they are in general far more beneficial than none at all, or than those which would be available in the crowded city. In this way, as in many others, the electric railway is an important factor in improving the health and increasing the happiness of city people.

The street railways of smaller towns likewise render an important service in furthering the social life and the recreations of the people. Indeed it is probable that a larger proportion of the traffic of railways in such places may be considered pleasure travel than in the great cities.

Street railway parks.—An interesting development in the street railway business, which has taken place almost wholly since the introduction of electricity, is the establishment of parks and resorts by the street railways themselves. A very large proportion of street railway companies now operate, either directly or indirectly, amusement and recreation places of some sort. The companies which reported to the Bureau of the Census that they maintained such enterprises numbered 289, and some of these have two or more parks. Table 97 indicates, for each company, the number of parks operated. An attempt was made, in connection with the present investigation, to obtain a statement of the number of persons visiting these street railway resorts during the census year. It was found, however, that many of the companies were unable to make even the roughest estimate on this point, while others submitted estimates that were obviously very far from correct, and the data were, accordingly, omitted from the report.

It is much more common for street railway companies to maintain parks in the medium-sized and smaller cities and towns than in the great cities, where places of recreation are amply supplied by public authorities or by independent private enterprise. Of urban centers of 500,000 or more inhabitants the only ones in which important parks are operated by urban railway companies are Philadelphia, Pittsburg, and Baltimore. The Pittsburg Railways Company reports 2,113,340 visitors to its parks during the census year. The centers of from 100,000 to 500,000 population in which street railway parks of importance exist are Washington, D. C.; Minneapolis-St. Paul, Minn., where the company has 4 parks, with an estimate of 1,000,000 visitors during the year 1902; Kansas City and St. Joseph, Mo.; New Orleans, La. (965,000 visitors); Indianapolis, Ind.; Columbus, Ohio (455,000 visitors); and New Haven, Conn.

(600,000 visitors). The interurban railways radiating from some of the other large cities also operate parks. Among other companies whose parks are an important feature may be mentioned the Connecticut Railway and Lighting Company of Bridgeport and surrounding towns, which estimates that 800,000 persons visited its 3 parks in 1902; the People's Railway Company of Wilmington, Del., with 750,000 visitors; the United Traction Company of Reading, Pa., with 1,103,000 visitors; the Boston and Northern Railway Company, with 4 parks and 800,000 visitors; the Old Colony Railway Company of Massachusetts, with 600,000 visitors; the Butte (Mont.) Electric Railway, with 350,000 visitors; the Portland (Me.) Railroad Company, with 750,000 visitors; and the Seattle Electric Company, with 4 parks and 750,000 visitors.

In the case of some of the still smaller railways the traffic connected with the parks constitutes a very large proportion of the total business. The Bridgeton and Millville (N. J.) Railway estimates the visitors to its park at 350,000, while the total number of fare passengers for the year was 1,698,227. In judging of the importance of the traffic connected with the park in this, as in other cases, it should be remembered that probably most of the visitors to the park pay two fares. The railway at Muskegon, Mich., reports 250,000 park visitors, and total fare passengers, 1,655,762. The Kingston (N. Y.) Consolidated Railway estimates 500,000 visitors to its park, and total fare passengers, 2,217,334. The Youngstown (Ohio) Park and Falls Railway had 366,000 park visitors, its fare passengers numbering 1,241,016. Youngstown, however, has other more important railways. The Holyoke (Mass.) Street Railway Company reports 1,280,000 park visitors and 6,336,300 fare passengers.

In practically all cases street railway resorts are located at some distance from the closely built parts of cities and towns. One of the chief attractions to the patrons is the long, swift ride in the open car with the cooling breeze created by the motion. In a considerable number of instances the railways charge a second fare for the outer part of the trip to the resort. Thus the large park operated by the Union Traction Company of Philadelphia is about 13 miles from the city hall, and a fare of 5 cents is collected in addition to the city fare. The grounds are often of considerable size and present the attractions of woodland, sea, lake, or river, but since these natural features are not sufficient to create the traffic upon which the railway company depends for the profitableness of its resort, except possibly on Sundays and holidays, forms of amusement suitable for evening are usually provided. Some companies have invested large sums in fitting up their parks with theaters, merry-go-rounds, switchback railways, and similar attractions. Decorative and brilliant electric illumination is usually a prominent feature.

Many street railway companies incur heavy expense

in the operation of such resorts and parks. Admission to the grounds is almost always free, and while there is ordinarily a charge for some of the amusements, the statistics show that the total direct receipts from parks seldom materially exceed the running expenses and usually leave a deficit. The company expects its profit in the increase of transportation business. Some street railway men assert that even from this standpoint the maintenance of a park or resort is often an unprofitable enterprise. Local conditions vary widely, and a place of recreation which would pay well in one city would prove a failure in another. Among the difficulties mentioned are the facts that the traffic created is largely confined to a few months of the year and to pleasant days, that it is so heavy during certain hours in the season as usually to necessitate a double track, that empty cars must be accumulated to take people home at the close of the day or evening, and that it is often difficult to combine successfully in one individual the qualities of an efficient railway officer and director of recreation grounds.

V.

INADEQUACY OF PRESENT STREET RAILWAY FACILITIES IN GREAT CITIES.

Inadequate speed and carrying capacity.—Remarkable as have been the strides in methods of transportation, and important as are the social benefits which they confer, it is generally recognized that the railway service of our greatest cities is still inadequate. Indeed it may be doubted whether, as compared with the needs of the people, the facilities in such cities at present are any more adequate than they have been in the past. The city of New York naturally presents the most striking evidence of insufficient transportation, both on account of its enormous population and on account of the physical limitations upon the distribution of its population. The long and narrow Manhattan Island is cut off from the broad areas to the east and west by wide rivers, the facilities for crossing which have hitherto been hopelessly inadequate, so that the expansion of the population in these directions has been seriously hindered. More relief for that city will be secured by the construction of bridges and tunnels than by any improvement of railway service alone.

Leaving aside the question of fares in their relation to the use which the people make of the street railways, the inadequacy of street railway service consists chiefly in the insufficient speed of transit and the insufficient number of cars. These conditions are so familiar that they scarcely need to be illustrated.

Notwithstanding the immense saving in time effected by the street railways as compared with walking, the total number of hours which are still spent by the people of a metropolis in monotonous travel represents a great social waste. It is quite probable that the average citizen of such cities as New York, Philadelphia,

Boston, or Chicago, who takes the railway to and from his place of business regularly, spends not less than an hour every day on the cars, while thousands upon thousands spend two hours or more daily in this way. The uncertainty as to the length of time required to make a journey, due to the frequent blocking of traffic, is a further source of annoyance and loss. Naturally, the consumption of time in travel is usually more serious for those who live in the suburbs than for those in the city itself. The time required for the suburban end of the journey, however, is generally less than for that in the city proper, where the speed of cars is greatly restricted.

An illustration of the extent to which railway cars in large cities are habitually overcrowded at certain times of the day was given in connection with the proposal recently made by one of the elevated lines in New York to put on several additional trains during the afternoon hours in order to relieve congestion. The press in estimating the relief which would be afforded assumed that each train, according to the customary practice, would be able to carry 700, when, as a matter of fact, each train would seat about 300 persons. A count of the actual passengers on the surface cars passing north and south at the corner of Madison avenue and Fifty-ninth street in New York on December 29, 1902, showed the following conditions during rush hours: From 7 to 9 a. m. about 3,000 seated passengers passed to the south, with about 1,700 standing. From 6 to 7 p. m. about 4,300 seated passengers were carried to the north, with more than 3,200 standing. At several other points on surface lines during the same hours the overcrowding of cars was nearly as great.¹

In several of our cities surface railways may be said to have accomplished practically all that is possible toward meeting the need for ample and rapid transportation. All, or nearly all, the streets in the business centers of these cities are already occupied by tracks, and, as shown hereafter, the number of cars run over the tracks in those centers has reached the limit of safety. The introduction of electricity made possible some increase in speed, and thus not merely saved time but increased the number of cars which could be run over a given track, at the same time permitting the use of larger cars. The great increase in the number of passengers on the surface railways in our largest cities immediately after the substitution of electricity for animal power showed the importance of the relief afforded. But the demand for more and longer rides outran the progress of the surface railways. Difficulties more fully set forth below have made the increase of speed much less than would otherwise have been possible. The average schedule speed of electric surface cars in Chicago has been estimated at 8.22 miles per hour, which is only 24

miles per hour faster than the schedule time with horsepower.² In the more crowded streets in all great cities the speed is much less than the average, so that to take the car for a short trip may consume more time than to walk. Even the addition of elevated railways to surface systems has failed to meet fully the needs of transportation in our greatest cities.

Effects of inadequacy in transportation.—Some of the results of this inadequacy of urban railways are familiar. Rather than ride in slow and overcrowded cars, thousands of people walk even considerable distances to their business and on social errands. The growth of suburbs has been far less rapid than would have been the case with proper transit facilities. Although, as pointed out above, there has been a marked absolute increase in the number of suburban dwellers since 1890, the proportion of people who do business in the city and have their homes in the suburbs is still small, and great numbers, who would prefer to reside there, are unable to do so under present transportation conditions. Strictly suburban life is still almost wholly confined to the well-to-do.

Nor do the street railways accomplish all that could be desired in distributing population within the city itself. In several of our great cities are found overpopulated quarters occupied by the poorer working classes, composed largely of the foreign born and their immediate descendants. Most of these people do not use the street railways to any considerable extent, but live within walking distance of their places of employment. Of course, inadequacy of transportation is not the sole cause of overcrowding in such sections; other important influences contribute to it. In other cases city dwellers, although they live in quarters where there is no marked crowding, yet find their health and comfort impaired by the proximity of the smoky, dirty, noisy factories in which they must find their employment. The inadequacy of transportation agencies is one of the most important causes of these unsatisfactory adjustments of population. Doubtless to some extent the failure of certain classes to use the railways is due to poverty, and patronage would increase if fares were reduced; though, even under present conditions, the lower rent in outlying districts would often offset the cost of street car journeys. But the poor can not spare the time for railway rides. The time required to reach a less crowded section of the city is quite a different matter to the working man or woman who toils ten, eleven, or twelve hours every day at a regular occupation, from what it is to the business man or clerk who is employed from six to nine hours only.

The lower East Side of New York city is the most conspicuous illustration of a section tenanted by people who do not, to any important extent, patronize street railways. In the Seventh, Tenth, Eleventh, Thirteenth,

¹ Report of F. H. Shepard, transportation expert of the New York state board of railroad commissioners, *Street Railway Journal*, January 31, 1903.

² Report of B. J. Arnold on the Chicago Transportation Problem, 1902, page 49.

and Seventeenth wards (all below Fourteenth street and east of the Bowery), a population of 455,173 is huddled into an area of 979 acres (exclusive of parks and cemeteries). About one-fourth of the population of Manhattan Island thus occupies less than one-twelfth of its habitable area. Despite all the improvements in transportation the population in these wards has continued to grow, the increase from 1890 to 1900 being 34.1 per cent. While the density of population in the upper wards of Manhattan ranges from 90 to 180 per acre, these five wards have from 381 to 678 inhabitants per acre. Much the greater part of the people in this excessively crowded section find their employment in the immediate vicinity.

One other illustration may be taken from Philadelphia, a city which is subject to no such physical limitations upon its extension as New York, but which still has an overcrowded section. The Second, Third, and Fourth wards of the city, lying south of Market street, near the Delaware river, have a combined area about one-fifth as great as that of the Thirty-third ward, and less than one-fifth of that of the Twenty-eighth, Thirty-seventh, and Thirty-eighth wards jointly. The total population, however, of the Second, Third, and Fourth wards in 1900 was 82,461, or about one-fourth greater than that of the Thirty-third ward and only about one-sixth less than that of the three other wards mentioned. Furthermore, these three overcrowded wards increased their population 14.7 per cent between 1890 and 1900.

Several conditions which confront the street railways in cities of the first rank contribute to make the problem of furnishing adequate transportation an infinitely more difficult one than is encountered in smaller places. These conditions are not only to a large extent incapable of removal, but they grow more serious from year to year. They point to the necessity of comprehensive and far-seeing plans for the reorganization of methods of transportation.

Increase in demand for transportation more rapid than increase in population.—The comparative statistics of street railway traffic for urban centers of different sizes heretofore presented (page 19) show clearly that the number of street railway rides tends to increase faster than population. This tendency is even stronger than the traffic statistics indicate, since in the largest cities the actual traffic, for reasons already indicated, does not equal the needs of the people. As a matter of fact, the relationship between street railway rides and population revealed in these figures is a necessary one. For in the first place it is evident that, as the city grows in population and area, a constantly larger proportion of its citizens must, or at any rate should, reside so far from their places of employment as to require means of transportation. Moreover, as the city grows, the distance which must be covered by the average passenger increases. Still another cause of this relationship is found in the fact that as the population of a city in-

creases its individual citizen widens his social and economic circle and needs to be put into connection with more people; hence he more frequently requires transportation.

Local concentration of traffic.—The modern tendency toward greater local concentration of the business of a city, while itself a product, to a considerable extent, of improved methods of passenger transportation, constitutes in another sense a cause of the unsatisfactory condition of the street railway service. This concentration not only tends to increase the total number of persons needing transportation, but it draws so many railway lines and cars to a common center that the traffic there becomes congested by its very magnitude. One has only to stand for an hour at such a point as the corner of Madison and State streets in Chicago, the street railway terminus at City Hall in New York, or the Park street station in the Boston subway, to appreciate how greatly the enormous magnitude of the traffic interferes with rapid handling of it.

Unequal distribution of traffic.—Perhaps the most important source of difficulty in urban transportation lies in the fact that the traffic is very unequally distributed throughout the day. A large proportion of the passengers consist of people going to their places of employment in the morning and returning at night. The flow of shoppers toward the retail centers is better distributed through the day, but the return tide of shoppers is at its height during the very hours when employees are seeking their homes.

This inequality of traffic, though striking, is perhaps not so great as is sometimes supposed. A careful estimate made by the Metropolitan (Interurban) Street Railway Company (now the New York City Street Railway Company, a surface line) for all its lines on December 17 1902, put the number of passengers carried during the five busiest hours, from 7 a. m. to 10 a. m. and from 5 p. m. to 7 p. m., at about 35 per cent of the total number carried during the twenty-four hours—practically the entire traffic of the company being carried during eighteen hours. The Union Railway Company and the Southern Boulevard Railway Company, whose lines are in the less densely populated Bronx borough, estimated that about 40 per cent of their passengers were carried during these same five hours.¹

In every city there are certain points at which the distribution of traffic is much more unequal than is true of the street railway system as a whole, and at these points congestion of movement is likely to occur during the rush hours. This fact may be illustrated by further data regarding passengers on the north and south surface lines at Fifty-ninth street and Madison avenue in New York city. On December 29, 1902, about 4,700 passengers were carried on the southbound surface cars at that point during the hour from 7 to 8

¹ Wheatly, "The Passenger Traffic Problem of Greater New York," Street Railway Journal, January 10, 1903.

a. m., while at the same time less than 600 were carried north. From 9 to 10 a. m., on the other hand, only about 1,300 passengers were carried south and about 500 north, the total traffic in both directions being barely one-third as great as during the earlier hour. From 2 to 3 p. m. about 1,400 passengers rode toward the south and about 1,250 toward the north. From 6 to 7 p. m. only about 500 passengers were carried south, while nearly 7,600 passed toward the north, the total traffic being thus more than three times as great during this hour as from 2 to 3 o'clock.¹

Street railway companies, of course, adjust the movement of cars, in some measure, to this great variation in the traffic. Since ordinarily it is impossible to allow cars to collect in the business center of a city, the operation of additional cars for the accommodation of the traffic during the rush hours means that many partly empty cars must be run in the opposite direction at about the same time. This is often the case even where the cars running in the direction of greatest travel are seriously overcrowded. The total number of cars in operation in both directions during the rush hours is usually, moreover, materially greater than the number employed at other hours.

In the particular instance just mentioned, the number of cars passing Fifty-ninth street and Madison avenue toward the south from 7 to 9 a. m. was about four-fifths greater than the number moving in that direction from 9 to 11 a. m. The count of the passengers showed that while the cars south bound from 7 to 9 a. m. were greatly overcrowded, the cars north bound from 8 to 10 a. m. had less than one-third of the seating capacity occupied. The seating capacity of the cars running in both directions from 8 to 9 a. m. was about 4,500, while during several hours in the middle of the day the seating capacity of cars moving in both directions was only from 3,000 to 3,500 per hour. From 6 to 7 p. m., on the other hand, the cars passing both ways had a seating capacity of 6,100. Just before and during this rush hour, the south bound cars had only about two-fifths of their seats occupied, while from 6 to 7 p. m. barely half of the north bound passengers could find seats. The number of cars passing Madison avenue and Fifty-ninth street in the evening hours was smaller even than in the middle of the day, and yet a large part of the seating capacity of those south bound was unoccupied. A comparison with similar counts at other points on the Metropolitan Railway system shows that the degree of inequality in the total number of cars moved which exists at Madison avenue and Fifty-ninth street is by no means exceptional. The traffic in a city like Brooklyn, which is chiefly a place of residence, is even more irregular. In this city the state board of railroad commissioners found in 1903 that the leading surface system was operating an average of 545

cars per hour during nonrush hours, while during the busy period of morning and evening it expected to run about 1,200 cars per hour.²

This irregularity in the distribution of traffic on street railways tends in two ways to hinder the provision of prompt and adequate service. In the first place, there are important instances in which, even though the railway companies might be willing to run a sufficient number of cars, they would be prevented from doing so by the physical limitations of their tracks. This point is more fully treated below.

In the second place, it costs more to handle a given number of passengers irregularly distributed than would be the case if they were evenly distributed through the day. Railway companies are, therefore, naturally indisposed to incur the expense which would be entailed by furnishing sufficient cars to seat all passengers during the busy hours. Even under present conditions, when cars are so greatly overcrowded, the inequality in the distribution of cars is a source of complaint among street railway managers. They are constantly lamenting over the "peaks in the load line." A larger power plant and more cars are necessary to maintain the present schedules than would be required if the number of cars could be evenly distributed throughout the day. Fixed charges per unit of traffic are accordingly increased. Even the current expenses in the running of cars are somewhat augmented by the unequal distribution of traffic. Despite the most complicated adjustments of the trips of conductors and motormen to secure an even distribution of their work, most street railway companies in large cities are either forced to pay a certain number of their car-service employees full-time wages for operating cars only part of the day, or they must find men who are willing to work and draw pay for a part of the day and who usually must be paid at higher hourly rates than the full-time employees. The so-called "tripper" problem constantly confronts the manager of an urban railway.

Causes limiting speed and carrying capacity of surface railways.—Four facts connected with surface railway transportation put very rigid limits upon the speed and carrying capacity of electric surface cars in cities, namely, the frequency of the necessary stops, the danger to pedestrians in crowded streets, the interference of cars with one another, and the blocking of the tracks by other vehicles. The first two limitations are obvious. The danger of accident is indicated by the statistics elsewhere presented. The number of persons, other than passengers, who are killed or injured by street cars is very considerable. The last two limitations require more extended consideration.

The number of cars which can be run over a given railway route, as a whole, depends upon the number which can pass the point where the greatest interference is encountered and where the speed is least. To increase

¹ Report of F. H. Shepard, Street Railway Journal, January 31, 1903.

² Street Railway Journal, Vol. XXII, 1903, page 1039.

the speed over other parts of the route will not enable more cars to be operated. At many points where important railway lines cross one another in the business centers of cities, the extreme limit of the number of cars which can be safely operated has already been reached.

An investigation made at the instance of the Merchants' Association of New York in 1903 showed that the number of cars which passed the intersection of the Broadway and Twenty-third street lines was no less than 573 per hour. At Broadway, Sixth avenue, and Thirty-fourth street (Herald square), where two north and south lines and one cross town line intersect, the number of cars per hour was 464. Several other points showed as great congestion of traffic.¹ The crowding of surface cars at the New York end of the first East River bridge is likewise enormous. Here the difficulty is enhanced by the fact that the several car routes terminate at the bridge. Unlike the cars from Brooklyn, which pass around closed loops, the Manhattan cars run up to stub ends, and considerable delay is caused by the necessity of changing gates, fender, and controller handle to the other end of the car.

The traffic in the business center of Chicago is also hampered by the necessity, under present arrangements, of running many cars to stub terminals. The use of the cable system, with the difficulty at railway crossings due to the necessity of dropping the cable, tends still further to limit the number of cars which can pass over the tracks in the heart of Chicago. According to a recent report it is impossible to increase the number of cars on most of the lines which run into the business center, and very little improvement in service can be made without radical changes in methods.²

At the corner of Eighth and Market streets in Philadelphia, where a single track crosses a double track, 315 cars pass between 5 and 6 o'clock every afternoon.³

It is evident that even if there were no other vehicles besides cars it would be difficult to operate many more cars than now pass such points as have been described, but the situation is made much worse by other classes of vehicles. Interference from this source is inevitable in the business quarters of cities, particularly where, as too often happens, the streets are absurdly narrow and suited only to the primitive conditions under which they were laid out. A conflict of interests exists between the commerce and trade of the great city (which require the most speedy and convenient handling of merchandise) and the patrons of the street railways. It has frequently been asserted, not merely by street railway men, but by public authorities and citizens' organizations as well, that at present the owners and drivers of vehicles do not sufficiently regard the rights

of the street railway and its passengers. Truckmen prefer to drive on the railway tracks because of the smooth surface afforded the wheels, and they do not always turn out as promptly as they could. Moreover drays are often backed up to the curb and left standing for some time in such a way as to make it impossible for street cars to pass; in many such cases it would be possible for the dray to avoid interference by standing lengthwise of the street. Again there are frequent blockades of vehicles, in part unavoidable with the enormous traffic, in part due to the lack of stringent and well-enforced "rules of the road."

How easily vehicle traffic may interfere with the movement of street cars may be judged from a count taken by the Metropolitan Street Railway of New York on December 27, 1902. During the hour from 11 a. m. to 12 m. 1,910 vehicles, not including cars, crossed the tracks of the company at the junction of Broadway and Twenty-third street. From 3 to 4 p. m. 1,250 vehicles crossed the tracks at Canal street and West Broadway, while during the same hour at each of three points on lower Broadway more than 1,000 vehicles crossed.⁴ The New York State Board of Railroad Commissioners in 1903, after investigating the complaints regarding the inadequate service on the surface railways of Manhattan, asserted that "the very first and largest measure of immediate relief that can be obtained is that which could be derived from the regulation of independent vehicles in the streets." The board further expressed the belief that with adequate regulation of vehicles and with the removal of the obstructions due to the building of the subway, 25 per cent more cars could be operated, even during rush hours. In accordance with these recommendations certain new regulations have recently been adopted by the city authorities.

Elevated railways.—In view of the conditions which have been described, it is possible that a wholly satisfactory solution of the problem of transportation in great and rapidly growing cities may never be attained. What is wanted, eliminating the question of fares, is simply more cars and higher speed, but while there has been a steady progress in both of these directions, serious physical and financial difficulties stand in the way of adequately meeting the requirements. It long ago became apparent that in the largest cities the surface railways must be supplemented either by elevated or by underground lines, which would both increase the number of available tracks where the traffic was most dense, and greatly add to the speed of travel, thus saving time and lengthening possible journeys.

The first elevated urban railway in the world was chartered in New York as far back as 1867. It was the Greenwich street and Ninth avenue line. Before 1880, the system in Manhattan had attained almost its present form, in which four trunk lines run lengthwise of the narrow island. The relief afforded by these elevated

¹ Report of F. H. Shepard, *Street Railway Journal*, January 31, 1903.

² Report of B. J. Arnold to the Chicago city council.

³ Wheatly, "The Philadelphia Rapid Transit System," *Street Railway Journal*, April 4, 1903.

⁴ Wheatly, *Street Railway Journal*, January 17, 1903.

lines was enormous. During the eighties an extensive elevated system was also built in Brooklyn.

The extension of the population northward, which the elevated lines of Manhattan had quickly aided, developed a traffic which soon overtaxed their capacity. The laying of a third track over part of their structures increased somewhat the possible number of trains, and also permitted the operation of express trains which, by making very few stops, especially during the middle part of the trip, could carry passengers from the foot of the island to Harlem or the Bronx in about half an hour. These express trains were introduced almost solely to meet the heavier traffic at rush hours. But elevated lines suffer even more than the surface lines from the unequal distribution of traffic. The greater proportion of their passengers are persons going to their business in the morning and returning home at night. The longest train which the steam engines, formerly used in New York, could haul was five cars. It became impossible to increase further the number of trains at rush times; indeed, blockades at the terminals, which are quite inadequate in platform space and in number of switch tracks, were of frequent occurrence. In 1902 the vice-president of the Manhattan Railway Company stated that during the rush period 81 trains per hour, going north alone, passed the junction of the Sixth and Ninth avenue lines at Fifty-third street, a number which could not with safety be exceeded, since about half of the trains are compelled to cross tracks at this junction.¹ For these reasons, tens of thousands of long-distance passengers in New York, who would have preferred to take the elevated trains, were compelled by the overcrowding to patronize the slower surface cars.

It is a remarkable fact that the number of passengers carried on the Manhattan Elevated Railway actually decreased considerably for several years. In the year ending September 30, 1901, the passengers numbered 191,152,316, nearly the same as in 1890, and more than 28,000,000 less than in 1893. The traffic on the Brooklyn elevated lines decreased still more, falling from 100,181,372 passengers (including transfer passengers), in 1893 to 62,587,361 in 1901. This decrease in elevated traffic is doubtless attributable chiefly to the improvement of the surface railways, which offered advantages to short-distance passengers in the greater number of their lines and the frequency of stops.

The installation of electricity on the elevated lines of New York and Brooklyn during the years 1901 to 1903 has materially increased their carrying capacity, by making it possible to operate trains of six cars and to maintain a somewhat higher average speed. As a result the passenger traffic has risen rapidly, the number of passengers carried by the Manhattan Railway reaching 255,565,390 in the year ending September 30, 1903, an increase of more than 30 per cent over 1901. But

the present elevated lines of Manhattan have now almost reached the limit of improvement, and they do not begin to meet the demand for rapid long-distance transportation. The capacity of the Brooklyn elevated railways has heretofore been limited chiefly by the concentration at a single bridge terminal. It is now proposed, however, to make use of the new Williamsburg bridge for elevated trains, and this will greatly relieve the congestion.

Beginning in 1892, four elevated railway systems, radiating from the business center, were constructed in Chicago. While the traffic of these lines is much lighter than in New York, the single loop around the business center, which is used by all of them jointly for all trains, has virtually reached the limit of its capacity.

It is, of course, possible to increase considerably the number of elevated lines in any city, even in New York, and thereby to relieve the congestion of traffic. The construction of additional tracks in the crowded business centers toward which trains converge would alone add greatly to the carrying capacity. But serious objections lie against elevated railways in the more important streets. The pillars interfere with traffic on the surface; the structures are usually ugly and shut out the light from the street and buildings below; and the noise of the trains is a very great annoyance. As a result, the value of real estate on certain streets occupied by elevated railways, particularly in the residential sections, has either been diminished or has increased less rapidly than elsewhere, and the companies have been compelled to pay large sums for damages to property. For these reasons the attitude of the people and of municipal authorities is usually one of strong opposition to the erection of additional elevated structures in the business centers or on the more important residential streets. It is doubtful whether any new elevated lines would be tolerated on Manhattan Island.

Nevertheless, subway railways, which are the only alternative to elevated lines for rapid urban transportation, are much more expensive, and it is probable that a considerable extension of elevated railways in the suburbs of several of the leading cities of this country will be seen. Where the city is not contracted in area by geographic peculiarities it may prove socially and financially profitable to devote a few of the streets to these structures despite their disadvantages. The present tendency, as shown in existing or contemplated systems in Boston, Philadelphia, and Chicago, is toward the combination of elevated with subway construction for rapid transit railways. The fact that the elevated and subway lines in New York have come under the control of a single company may mean ultimately some passage of trains from elevated tracks to subway.

Subways.—Subways in connection with urban passenger transportation may serve two quite different purposes. They may be used to carry through the more densely crowded business center of the city the cars

¹ Wheatly, Street Railway Journal, January 10, 1903.

which elsewhere operate on the surface, or they may be used in any part of the city for the operation of cars and trains at higher rates of speed than would be possible on the surface. These two classes may be conveniently designated by the terms subways for surface cars and rapid transit subways. The two functions may in some cases be combined in a single subway. Subways for surface cars are naturally comparatively short. If rapid transit is sought, either the subway must be greatly extended or it must connect outside of the business center with elevated lines.

European cities preceded those of our own country in the construction of subways. London's underground steam railroads date back many years. The first underground electric line was opened in Budapest about 1896. Within the past few years high-speed electric subway railways have been constructed in London, Berlin, and Paris, and very extensive additions to these lines are in process of construction or are planned.

Aside from a few short and insignificant tunnels for surface cars, such as those under the Chicago river, the first subway for urban transportation in the United States was that constructed by the city of Boston, opened for operation in 1897. The narrowness and crookedness of most streets in the business center of Boston, and the concentration of traffic in Washington and Tremont streets, rendered the operation of surface cars utterly unsatisfactory. The present subway, most of which lies under Tremont street, has a total length of about $1\frac{1}{2}$ miles. It accommodates both surface cars and high-speed electric trains, the latter emerging from the subway onto an elevated structure. For that part of its length in which the surface cars operate there are four tracks, two for each class of traffic. The subway is leased to the Boston Elevated Railway Company, which operates both the elevated and the surface systems of the city. The center of the elevated system is a large loop, of which the subway constitutes one side, inclosing the chief business section. From the loop radiate two lines, one toward the southwest, extending into Roxbury, and the other across the Charles river into Charlestown. The total length of the elevated and subway lines is about 8 miles of double track. Passengers coming from more distant points are given transfers to the elevated trains at the terminals, while, in the subway itself, passengers may transfer freely from surface cars to the elevated train, or from the elevated train to surface cars in cases where the cars are going in the same general direction. At present no surface cars run entirely through the subway. Those entering from one direction pass around a loop at Park street and return, while those from other directions pass around a loop at Scollay square. The short distance between these two loops is traversed only by elevated cars, but passengers, by a double transfer, can pass from the surface lines at one end of the subway to those at the other.

Great as has been the relief afforded by the Boston subway and elevated system, the situation is still far from satisfactory. The subway is so short as to necessitate sharp curves, and these diminish speed to such an extent that the subway accommodates with difficulty the cars which are already turned into it. To relieve the situation the city has planned to construct two practically parallel subways through the business center of Boston. One of these, under Washington street, will be used for the elevated trains, and the other, under Devonshire street, will be for surface cars. It is proposed when the Washington street subway is completed to withdraw the elevated trains from the Tremont street subway and devote it wholly to surface cars, part of which, at least, will then pass through its entire length instead of going around loops. A tunnel for street cars has just been completed under the bay to East Boston. When these plans are completed, the chief direction in which further development can be made will be in lengthening the present elevated lines and constructing one or more additional radiating lines for fast service, either on elevated structures or in subways. Definite plans of this nature are already under consideration.

Much more ambitious is the purpose of the New York Rapid Transit Subway, which will soon be ready for operation. The purpose here is to accommodate exclusively long-distance traffic. The tracks are kept underground for about three-fourths of their length, but for several miles in the northern part of Manhattan Island they are on a viaduct. The present subway extends from the city hall, where it terminates in a large loop, north on Center street and Fourth avenue to Forty-second street, thence west to Broadway and north on Broadway. At One hundred and fourth street the subway divides, one branch crossing Central park and running northeast to Bronx park, while the other, or direct line, continues north to Kingsbridge. The total length of the present subway is 20.81 miles. The subway below One hundred and fourth street has four tracks. On two of these, "accommodation" trains will be operated, stopping at intervals of from one-fourth to one-half mile, and maintaining an average speed of about 15 miles per hour. Over the other tracks will run express trains, making fewer stops and with much higher speed. The branches above One hundred and fourth street have two tracks. The upper parts of both branches reach into territory now rather sparsely built, which gives opportunity for considerable expansion of population.¹

It has been estimated by experts that by the time the new subway is opened the long-distance travel on Manhattan Island will fully equal the capacity of both subway and elevated lines, and that the congestion of traffic

¹ Report of the Board of Rapid Transit Railroad Commissioners, 1900-1901.

will be as great after the subway is opened as it was before its construction was begun in 1900. The maximum capacity of the subway is estimated at 30 express trains and 50 local trains per hour in one direction, with a total seating capacity of 28,000 or a possible capacity when crowded of about 43,000 persons per hour. The elevated trains at present carry more than three times that number in one direction during rush hours. Nevertheless, a great relief will be afforded to the overcrowded elevated lines and to the thousands of long-distance passengers who now take the surface cars. The decrease in the amount of such traffic on the surface lines, by increasing the available space in the cars, will, it is believed, lead many people to ride short distances who now prefer to walk. Already plans are on foot for the construction of additional north and south subways in Manhattan Island, and it is evident that with the constant increase in population, only rapid progress in this direction will keep pace with the growing need for transportation.

Further relief for the population of Greater New York will result from the tunnels and bridges which are under construction, or planned, across the North and East rivers. These improvements are of a character so strictly bound up with the peculiar local geographic conditions that they throw less light upon the general problem of urban transportation than do the subways in Manhattan itself. It may be noted, however, that one prominent feature in the improvements which are to be effected in connection with these bridges and tunnels will probably be the additional use of elevated and subway tracks in the crowded parts of Manhattan and Brooklyn, both for the accommodation of surface cars and for the operation of fast trains.

In Philadelphia a comprehensive plan for securing rapid transit and for relieving the congestion of surface traffic is now in process of execution. The plan involves a subway about two miles long running under Market street, the leading business thoroughfare. The subway will pass around the city hall in a small loop. In addition, a larger loop, beginning at about the same place, will be constructed around the principal business center. This latter loop will have for its longer sides Arch street, two blocks to the north of Market street, and Walnut street, two blocks to the south. The subway west of the city hall will have four tracks, two for surface cars and two for trains which are to pass upon elevated structures at the termini of the subway. For the rest of its length the subway will have two tracks only. The elevated lines to be opened first will consist of a short spur along the river front south from the eastern foot of Market street, and a much longer line west on Market street to Sixty-third street, about $4\frac{1}{2}$ miles from the city hall. Several other elevated railways are planned, branching to the north and south at three different points on the central stem.

Plans for the improvement of transportation conditions in other cities by means of elevated railways and subways have not yet reached such an advanced stage of development. In Pittsburg it has been proposed to construct an elevated railway in the business center of the city, subway construction being practically out of the question on account of the physical conditions. In Chicago, among other measures for the relief of the transportation situation, such as the construction of additional loops on the present elevated railways in the center of the city, plans are on foot for the construction of an elaborate system of subways, running in both directions under several of the streets in the business center, for the use of the surface cars.

An important point in connection with elevated and subway railways has to do with the relations between them and the surface lines. In Brooklyn, Boston, and Philadelphia, single companies control both systems, while in Manhattan and Chicago the elevated and surface lines are controlled by different companies; the Manhattan subway and elevated lines, however, being controlled by one company. It is evident that the most satisfactory service to the people will be rendered where transfer from one system to the other is easy and free. A normal arrangement would be one of radiating elevated or subway trunk lines, with interlacing and parallel surface lines, by which the passenger could more precisely reach his destination.

Satisfactory suburban and interurban service can be secured only in connection with elevated or subway lines in the densely populated parts of the great cities. There seems no reason why the suburban and interurban cars should not be run directly onto the rapid transit lines in the city, as the cars could be so constructed that they could be connected with the regular elevated or subway trains. Something of this sort already exists in Brooklyn where, at the ends of some of the elevated structures, the trains descend to the surface and continue into the suburbs. It will probably not be long before the interurban railways radiating from such cities as Cleveland, Detroit, and Cincinnati will take the initiative in the provision of some method by which their cars can reach the centers of these cities at high speed.

The chief difficulty which stands in the way of a rapid development of subway systems for fast long-distance urban transportation is the heavy cost of construction. The cost varies greatly with local conditions. In New York, where an immense amount of rock excavation has been necessary, the present subway and tracks, exclusive of power house and equipment, and of damages to abutting property, will cost the city about \$36,500,000, or about \$1,750,000 per mile of line. From the standpoint of profits, moreover, both elevated and subway railways intended for fast traffic are confronted by the facts that most of their passengers ride long distances; that a majority must be carried to a single business cen-

ter; and that a very large proportion of the traffic is during the few rush hours. As population, aided by the facilities offered, extends farther from the center of the city, these peculiarities will become more marked. Nevertheless there is every reason to believe that, either through private or public enterprise, additional subways will gradually be constructed in New York and other cities. It is conceivable that, as subways and elevated railways become more adequate to handle the entire long-distance traffic, while short-distance traffic becomes the chief business of the surface lines, some difference in fares between the two may be established, presumably by a reduction in the present fares of the surface railways.

VI.

STREET RAILWAY FARES.

Prevalence of the 5-cent fare.—The rate of fare on about two-thirds of the urban street railways in the United States is 5 cents for any distance covered by a single car. The journey is often extended by means of transfers to other cars, a practice which will be fully discussed in the succeeding section. The practice, very common in Europe, of grading fares according to distance, does not exist in any proper sense in American cities. In some cases the restrictions on transfers are such that certain journeys within the city limits can be accomplished only by paying two fares. Naturally this is usually the case where different parts of a city are served by distinct companies. The most conspicuous illustration is in Chicago, where the railway systems of the south, west, and north sides are operated as independent units. The one-city one-fare principle is being strongly urged for Chicago. Consolidation of street railways has already virtually brought this about in most cities. American street railway managers very generally maintain that the uniform fare is more advantageous to the public than fares graded according to distance. Their strongest argument is that the graduation of fares would tend to restrict the expansion of the residential area of cities. They sometimes claim that this effect would be the more certain because to reduce fares for short distances to, say, 2 or 3 cents would make it necessary to raise the charge for longer distances above 5 cents. This necessity might, indeed, arise in cases where the present 5-cent fare brings only a low return to the railway companies, although the reduction in earnings through a lower fare would be at least partly offset by increased traffic. It is of interest to observe that in several German cities, where graded fares formerly prevailed, the uniform charge for all distances, at least within city limits, has lately been substituted.

The 5-cent fare likewise prevails on a majority of interurban lines, which either are so short that a fare of 5 cents will cover a ride over their entire length, or

else collect this amount at different stages of longer journeys. The longer and faster interurban railways in most cases, however, collect single fares for the entire distance traveled by the passenger, issuing tickets in somewhat the same way as do the steam railways.

For the street railways of the country as a whole the average fare during the census year, obtained by dividing the receipts from passengers by the number of fare passengers carried, was 4.94 cents. On urban railways in cities of more than 500,000 inhabitants the average fare was 4.82 cents; in urban centers of from 100,000 to 500,000 inhabitants it was 4.93 cents; in those of 25,000 to 100,000 inhabitants, 4.78 cents; and in those of less than 25,000 inhabitants, 4.83 cents.

The fact that the average fare on urban railways of each group is thus somewhat less than 5 cents per passenger is due to the existence on certain railways of lower rates open to all passengers; to special rates on other railways for certain classes of passengers, particularly for children and workmen; and to some extent to the counting of transfer passengers as full-fare passengers in cases where an extra charge less than the full fare is made for a transfer. This latter practice prevails, for example, in Philadelphia.

Reduced fares open to all classes of passengers.—The returns made to the Bureau of the Census show that more than one-third of all the operating street railways in the United States offer fares of less than 5 cents to all of their patrons under certain conditions. In almost all such cases the cash fare for a single trip is 5 cents, but tickets for a number of trips are sold at reduced rates. Sometimes these tickets are good only during the busy hours of the morning and evening. The reports in the present investigation do not, in some cases, indicate whether the reduced fares are so restricted or not. More than 200 railway companies offer tickets at a price of approximately 4 cents each. By far the most common practice among such railways is to sell 6 tickets for 25 cents. Sometimes a further reduction is made if a larger number of tickets is bought, 25 tickets being frequently sold for \$1, and sometimes 26 or even more. On some railways the reduced fare is granted only to those who buy tickets to the value of \$1. It is quite common for such companies to sell 24 or 25 tickets for \$1. This is the custom, for instance, on the lines of the Connecticut Railway and Lighting Company, and on the systems at Springfield, Ill., Des Moines, Iowa, Muskegon, Mich., Syracuse, N. Y., Chattanooga, Tenn., Seattle, Wash., and a considerable number of smaller places. Occasionally, the purchase of a still larger number of tickets is required in order that the reduced fare may be obtained. Thus the Torrington and Winchester Railway in Connecticut sells 75 tickets for \$3, and the companies at Atchison, Kans., and Cumberland, Md., with one or two others, sell 100 for \$4. Two railways, in Olean, N. Y., and Bradford, Pa., require the passen-

ger to buy 200 tickets in order to get a 4-cent fare, while the Altoona and Logan Valley Electric Railway Company of Altoona, Pa., offers 500 tickets for \$20. It is evident that a great majority of passengers will not take advantage of reduced fares if they are required to buy more than a dollar's worth of tickets at a time.

The approximately 4-cent fare in the various forms mentioned is found for the most part in cities and towns of medium or small size. In no urban center of more than 500,000 inhabitants are tickets sold to all classes of passengers at reduced rates. The largest cities in which, at the time of the census, 6 tickets were sold for 25 cents were Washington, D. C., Detroit, Mich., Milwaukee, Wis., Dayton, Ohio, Indianapolis, Ind., Reading, Pa., Worcester, Mass., Utica, N. Y., Wilmington, Del., and Richmond, Va. In Detroit, however, these tickets are good only during the "rush hours" of morning and evening, and the same may be true in some of the other cities named. Subsequent to the date of the census, the two railway companies in Cleveland, Ohio, reduced fares to the same basis, but they later restored the straight 5-cent fare.

The sale of tickets to patrons generally at reduced rates is quite rare among the street railways of New England, although a few of them grant lower rates to passengers who buy a dollar's worth of tickets. In the smaller cities and towns of New York, a considerable number of railways sell 6 tickets for 25 cents. This is the practice, for example, in Binghamton, Oswego, Rome, and Schenectady. On several railways in this state 24 or 25 tickets are offered for \$1. Pennsylvania has even more railways which sell 6 tickets for 25 cents than New York. Among the more important Pennsylvania railways offering this rate are the Chester Traction Company, of Chester and vicinity; the Conestoga Traction Company, of Lancaster and vicinity; the Lebanon Valley Traction Company, of Lebanon and vicinity; the Schuylkill Valley Traction Company, of Norristown and vicinity; the Wilkesbarre and Wyoming Valley Traction Company; the Warren Street Railway Company; and the United Traction Company, of Reading. Altogether, there are more than forty street railways in this state which have approximately a 4-cent fare.

In the Middle Western states of Ohio, Michigan, Indiana, Illinois, and Wisconsin, the reduced fare, usually in the form of 6 tickets for 25 cents, is more common than elsewhere, and may almost be said to be the prevailing rate, except in two or three of the largest cities and on interurban railways. Practically all urban street railways in Indiana and Wisconsin sell 6 tickets for 25 cents, and the same is true of more than twenty-five of the street railways of Ohio. A fare at least as low as $4\frac{1}{2}$ cents is available for all passengers in every city of more than 25,000 inhabitants in Ohio, except Youngstown, Toledo, and Cincinnati. A fare of approximately 4 cents appears also in about a dozen places

in Iowa, the largest of which is Des Moines. Similar rates are also found occasionally in the Western and Southern states.

Fares even lower than 4 cents exist in a few cities and towns. The most familiar instance is Detroit, Mich., where, on part of the system now operated by the Detroit United Railways Company, 8 tickets for 25 cents are sold, in accordance with the terms of the franchise under which these lines were constructed. The new Central Market Street Railway in Columbus, Ohio, sells 8 tickets for 25 cents, while the older street railways in this city offer 7 tickets for 25 cents. The rate of 7 tickets for 25 cents also prevails in Salem and Delaware, Ohio, while in two or three other towns of the state where 6 tickets are sold for 25 cents, 27 may be bought for \$1. A rate of 7 tickets for 25 cents is also made on the Pittsburg, McKeesport, and Greensburg Railway, of Pennsylvania, while in Kansas one of the minor companies offers 28 tickets for \$1 and another 30.

In addition to railways which thus practically fix their fares at 4 cents or less, there are a number which grant slight reductions from the 5-cent fare. The rate of 11 tickets for 50 cents exists in Pueblo, Colo., on two interurban railways of Maine, and in several other places. In Mobile, Ala.; Santa Barbara, Cal.; Colorado Springs, Colo.; Auburn, N. Y.; Lincoln, Nebr.; Toledo, Ohio; Spokane and Tacoma, Wash.; and a number of other places, the railways sell 22 tickets for \$1. The leading companies of northern New Jersey offer 21 tickets for \$1, while on a number of railways of minor importance in various parts of the country, from 105 to 110 tickets are sold for \$5.

Reduced fares for particular classes of passengers.— Sometimes street railway companies carry young children in company with their parents for half-fare. In Baltimore, Md., for example, the fare for children is 3 cents. It is probably more common, however, to charge full fare for children above a certain age and carry others free. A more important practice is that of granting reduced fares to school children. In such cases the most common rate is $2\frac{1}{2}$ cents, though sometimes 3 or 4 cents is charged. In New England, it is almost universal for street railways to carry school children at reduced rates. Outside of New England, the practice is frequently found in smaller cities and towns, and in a few instances, in large cities also. Among the important cities which offer a fare of $2\frac{1}{2}$ cents to school children are Boston, St. Louis, San Francisco, and Denver. Street railway companies presumably act on the theory that, by thus reducing the fares of school children, they will secure a considerable amount of traffic from those who would otherwise walk.

The practice of granting special rates to working people is comparatively rare in the United States. The returns to the Bureau of the Census do not indicate, in some cases, whether such special rates reported are limited in any way, and in other cases they do not show pre-

cisely the restrictions imposed; but usually there is no restriction except as to the time of day at which the journey is taken. In general, it may be said that the reduced fare for workingmen is confined to the hours from about 6 to 8 in the morning and from about 5 to 7 in the evening. Naturally any person who rides at that time may usually avail himself of the reduced fare. The special rate is sometimes confined to particular routes or distances. The practice is more common in New England than elsewhere. About sixteen of the street railway companies of Massachusetts reported reduced fares for workingmen, the most common rate being 2½ cents, although several railways reported 3 or 4 cents. The most important company which makes special rates for workingmen is the Boston and Northern Railway Company, which serves many cities and towns in eastern Massachusetts.

Among other instances of reduced fares for working people may be mentioned the practice of certain railways in the mining districts of Pennsylvania. For example, two companies centering at Shamokin, and several others elsewhere, sell 30 workingmen's tickets for \$1. The Detroit and Port Huron Shore Line and the Saginaw Valley Traction Company sell 8 tickets for 25 cents to workingmen, while the railways of Zanesville, Ohio, and Clinton and Dubuque, Iowa, make a 2½-cent rate. When the elevated railways were first opened in New York they charged a 10-cent fare, but were required by law to carry passengers for 5 cents during the rush hours morning and evening.

It is rarely if ever true that workingmen taking advantage of such special rates are confined to particular cars. One frequently hears the suggestion, on behalf of the more well-to-do patrons of American street railways, that a class distinction in cars and fares should be made systematically, as is frequently done in European cities. It is complained that the presence of laborers in a crowded car is often distasteful to many of the passengers, and that, in some cases, their working clothes soil those of the other passengers. Aside from the general objection that such a plan would be contrary to American ideas of equality, street railway officers are very generally opposed to it from a business standpoint. Presumably it would mean a loss in revenue in many cases, since the distinction probably would have to be made by lowering the fares of second-class passengers rather than by raising those of first-class passengers. It is also argued that the attempt to enforce any such distinction would be virtually impossible in those cities where traffic is heavy, and where to wait for a car of the desired class would be most annoying. In all probability, the cars or compartments with reduced fares would be largely patronized by all classes of people, and would be greatly overcrowded, while the first-class cars and compartments would run partly empty.¹

¹ The Report of the Massachusetts Railroad Commissioners for 1903 contains an interesting discussion of the subject.

VII.

TRANSFERS.

Prevalence of transfer system.—The fact that transfers were issued to more than one-fifth of the fare passengers on street railways in 1902 indicates the great importance of this practice in connection with the social service of street railways. As already pointed out, the proportion of passengers who transfer is highest in the large cities, where the railway lines are complex and where the distances to be covered are great. An examination of the detailed statistics for individual companies shows that there is scarcely an important surface railway in a city of more than 100,000 inhabitants which does not grant transfers on an extensive scale. The proportion of transfer to fare passengers, however, varies greatly among these railways. In the case of the Pittsburg Railways Company, which has 70 transfer points, only 11.4 per cent as many transfer as fare passengers are carried; and in Louisville, Ky., the proportion is still lower, 7.5 per cent. On the other hand, the great railway system of Boston, with only 38 transfer points, grants transfers to 51.7 per cent of its fare passengers. The construction of the elevated system in Boston, connecting by free transfer with many of the surface lines, has greatly increased the number of transfers granted. The Interurban Street Railway Company in New York has no less than 318 transfer points, and its transfer passengers are equal to about 40 per cent of its fare passengers. The Brooklyn Rapid Transit Company has a still larger number of transfer points, but the proportion of fare passengers who take transfers is much smaller—20 per cent. The Chicago Union Traction Company has 300 transfer points, and the proportion of transfer to fare passengers is 41 per cent.

The differences in the relative number of transfer stations and in the proportion of transfer passengers are due less to differences in the liberality with which transfers are granted than to differences in the geographic characteristics of cities, in the location of railway lines, and in the arrangement of continuous trips. Generally speaking, in most of our large cities, transfers are granted in such a way that a passenger can go from any point to any other point within the city limits, reached by the cars of the same company, unless the trip involves a return to approximately the starting point. Sometimes transfers are granted only on cash fares, not upon other transfers.

While transfers are given without charge in the great majority of instances there are a few exceptions, particularly where the transfers are between lines of separate companies. An arrangement of the latter type existed until recently between the Manhattan Railway's elevated lines and the Third Avenue Railroad Company's surface lines in New York, 3 cents being charged for a transfer ticket. The only important company

which requires payment for a large proportion of all transfers is the Union Traction Company of Philadelphia. An "exchange ticket" on its lines costs 8 cents, or 3 cents in addition to the single-trip fare. But the ticket is of indefinite duration and good at many different points, so that it can be held by the passenger until he has occasion to take a ride for which the transfer will serve. The company claims that the system has practically resulted in reducing the fares for a considerable portion of its patrons to a 4-cent basis, and that it is preferred by them to the granting of free transfers limited as to time and place. A considerable number of free transfer points also exist in Philadelphia.

Causes of the extension of transfer privileges.—The granting of transfers is largely a recent development. The consolidation of the street railways in most cities into one or two companies has offered opportunity for the extension of the system to a degree previously impossible. The transfer has served to increase greatly the possible length of ride which can be taken for a single fare, and to lengthen materially the average ride of all passengers. Moreover, the use of transfers makes it possible, without adding to the aggregate number of car miles operated, to increase the frequency of service between the more widely separated parts of a city. It might be possible for a railway company to cover the trip from a point on one line to a point on another line by a continuous car. In fact, in some European cities, complicated routes are arranged so that a person can go from any part of the city to almost any other part without change of cars. To carry out such an arrangement to its full extent, however, means that the cars which cover a given trip between widely separated points must run on a very infrequent schedule unless they run largely empty. By breaking the possible journeys into separate units connected by means of transfers, it becomes possible to operate on each unit of track the number of cars which the amount of its traffic demands, and often also to collect into a single car passengers transferred from several different lines.

The extension of the transfer system is partly the result of a direct popular demand. This demand, in the opinion of various street railway managers, would have expressed itself in a movement for lower fares had it not been met by greater liberality in regard to transfers. In several cities transfers are now made compulsory by law. Thus the present street railway law of the state of New York provides that any company, which has obtained its franchise since the law was passed, must, for a single fare, carry passengers between any two points within the limits of a single city which can be reached by its lines. When the control of the Third Avenue Railroad and its subsidiary lines was secured by the Metropolitan (Interurban) Street Railway Company, it was at first held by the latter company that the two railway systems were distinct,

and that transfers between them were not obligatory under the law, but the courts have taken the opposite position in a recent case. The same decision, however, upheld the railway company in its refusal to issue transfers at certain points, on the ground that the congestion of traffic there renders the transfer of passengers dangerous to life and limb.

In Chicago the city council, under its authority to regulate the charges of railway companies, has passed an ordinance requiring every street railway to grant a free transfer from a car on which a cash fare has been paid to the cars of any other of its lines with which it connects. Transfers are good only if used within one hour. The supreme court of Illinois has held that the power to regulate fares includes the power to require the issue of transfers, or, in other words, the power to regulate the fare charged for trips over more than one line of the same company. It has also held that transfers must be granted between the lines of the Chicago Union Traction Company and those of the Chicago Consolidated Traction Company, since the former corporation controls the latter.¹

As a rule street railway companies themselves have been liberal in their policy regarding transfers, and have made most of the extensions of the transfer privilege on their own initiative, in the belief that traffic and profits would be increased thereby. The head of one of the largest street railway systems in the country has stated that, in his opinion, nothing since the adoption of electric traction has done more to increase the receipts of his company than the giving of transfers. Other highly favorable opinions regarding the financial results of the system have frequently been expressed by prominent street railway managers. It is reasoned that for many people the extent to which street cars are patronized depends largely on the convenience of the service; that street car riding is, in some measure, a matter of habit which can be cultivated; and that, as a result of the longer possible rides under the transfer system, thousands of people live in the outskirts of the city or in the suburbs who would otherwise seek homes within walking distance of their places of business.

Difficulties in administration of transfer system.—The use of transfers involves certain administrative difficulties which are not fully appreciated by patrons of street railways. The railway company can not reasonably be asked to issue a stop-over ticket which will allow the passenger an indefinite amount of time at the transfer point. Still less can it be expected to grant transfers in such a way that the passenger can return to his starting point without paying an additional fare. In most cities there are railway lines so situated that an unlimited grant of transfers would make this possible, particularly if transfers be issued upon transfers. For this reason companies sometimes decline to permit

¹ Chicago Union Traction Company vs. City of Chicago, 65 Northwestern Reporter, pages 451 and 470, October 25, 1902.

transfers at certain points where they would be of material convenience to many people. Other companies, however, prefer to incur the comparatively small loss due to the failure of a few passengers to pay fares for what are practically return trips, rather than to displease the public by withholding transfers which can reasonably be demanded. An effective enforcement of the time limit on transfers would do away with many of the abuses of the system, but such enforcement is often found to involve considerable difficulty, and the railways naturally desire to avoid altercations between conductors and passengers as to the validity of transfers.

A further difficulty arises from the fact that passengers occasionally take transfers which they do not need and give them to other persons, who either use them themselves or sell them at a reduced price. Still more serious is the fraud sometimes practiced by conductors, by which they turn in transfers obtained from passengers, or from other conductors, in collusion in place of cash fares which have actually been paid. Much difference of opinion exists among street railway managers as to whether there is more opportunity for this practice when transfers are registered or when they are not registered.

Notwithstanding all these difficulties, street railway

officers quite generally favor the transfer system, and believe that their losses through its abuse are small in the aggregate as compared with its advantages to themselves and to the people.

An act passed by the legislature of the state of Rhode Island in 1902 contains provisions which represent in a general way the ideas of railway men as to what constitutes a fair system of transfers. It requires every street railway company to issue a transfer to any cash-fare passenger in such a way as to enable him to reach any point in the city or town which can be reached by a second car, but which could not be reached by the first. The passenger must demand the transfer ticket at the time he pays his cash fare, and must continue his journey on the first car which passes the point of intersection. No company is required to issue a transfer which will enable a passenger "to return toward the point where he first took passage by a line running parallel with or in substantially the same general direction as the one to which he is transferred." Transfer tickets are not transferable, and any person who gives a transfer to another except to a conductor, or any person who offers to a conductor a transfer ticket which was not issued to himself, is subject to a fine.¹

¹ Public Laws of Rhode Island, 1902, chapter 965.

CHAPTER IV.

CAPITALIZATION.

Basis of statistics and method of presentation.—Table 93 shows for each company, both operating and lessor, the amount of authorized capital stock, whether common or preferred, the amount issued and outstanding, and the dividends declared thereon; the amount of authorized and outstanding funded debt, with the rate of interest thereon; and the combined total of the capital stock and funded debt outstanding. A further column shows the capitalization per mile of track owned by each company, based on the net capital liabilities, as described more fully hereafter. The statistics of 7 companies operating 134.98 miles of track are not given. In the case of most of these companies the electric railway system is part of an ordinary steam railway system, and the capital properly assignable to the former can not be segregated from the general capitalization of the company as a whole. The capitalization of 52.97 miles of track leased from steam railways by electric companies is also omitted for the same reason.

Many companies have promissory notes for considerable amounts outstanding. The schedule, however, did not distinguish between notes of this sort and other floating obligations, such as accounts payable, audited vouchers, etc., and for this reason it is impossible to ascertain for companies individually, or for all companies combined, the amount of floating debt which can be strictly designated by the term "bills and notes payable." In many instances such floating debt has been incurred, not for the purpose of construction and equipment, but merely as an incident to current operations. There are, however, a considerable number of companies, particularly in Massachusetts, which have borrowed large sums on promissory notes, to be used for construction or equipment, and these properly constitute a part of their capital liabilities. It is possible that the prevalence of this practice in Massachusetts is connected with the strict regulation by the state law of the amount of capital stock and funded debt of street railways. For companies having large floating debts of this character, the items in Table 93, showing the total capital stock and funded debt, and the net capital liabilities per mile of track, are, in a sense, misleading. In the case of various companies in Massachusetts, footnotes have been appended to the table calling attention to the fact that a large amount of floating debt is outstanding. To the extent that these floating debts are properly to be

considered capital liabilities, the total capital liabilities of street railway companies in the United States are understated. The amount so involved is, however, small as compared with the aggregate amount of capital stock and funded debt for the entire country.

A disturbing element in calculating the amount of capital liabilities per mile of track is found in the fact that many street railway companies own property other than the railway itself. Frequently one company owns securities of another street railway company. In the numerous cases in which an operating company owns the entire stock issue of a subsidiary company, the Census Bureau has usually dispensed with a report from the latter, and has treated the cost of its securities to the operating company as part of the cost of construction of the system of that company. In cases in which the securities owned are those of another company which reported to the Census Bureau, there is, of course, a duplication. Ordinarily the holding company has issued its own securities to an amount sufficient to cover the cost of the securities held, and expects to apply the dividends and interest which it obtains from the securities purchased to the payment of dividends and interest on its own issues based thereon. Even when securities are purchased by the use of a surplus, the transfer of part of the securities of one company into the treasury of another may be considered as, in a sense, reducing the aggregate amount of capitalization for the two combined. The holding company now derives (or at least hopes to derive) part of the income which its surplus should earn from the return on the securities owned, and need not demand so large a profit from the railway which it operates. For this reason the value of the securities of a reporting street railway which are owned by another reporting company should be deducted in determining the net capitalization based on the railway property of the holding company.

Again, it is very common for street railway companies to operate plants for the production of light and power for sale. The majority of such companies, however, declare that they are unable to distinguish at all accurately between the investment in the street railway branch and the investment in the light and power branch of the business. Accordingly, no attempt has been made in the returns of capitalization for individual companies or in the totals to segregate the value of light

and power plants. The fact that a company operates such a plant is indicated in a footnote in connection with the column showing the total capital liabilities, although, in the many cases where a company sells a small quantity of light or power without an appreciable extra investment of capital, no note is made of the fact. It is obviously improper to compare the capitalization per mile of track of street railways having light and power plants with that of other street railways. However, the figure of capitalization per mile of track for the United States as a whole, and the corresponding figures for most of the individual states and for groups of cities, are not largely affected by the presence of light and power plants. It is probable that the extra investment in such plants by the street and interurban railway companies of the country as a whole does not exceed 5 per cent of their total investment of capital. This opinion is strengthened by the fact that the total revenue of railway companies from sale of light and power is only 3.1 per cent of their operating earnings.

Footnotes to Table 93 call attention to the instances in which street railway companies have permanent investments aside from those in light and power plants and in their own railways. The amount of such investments has been stated wherever the company gave its consent, and that amount has been deducted in the calculation of the net capital liabilities based on the railway property. The figures in the last column of Table 93, showing the amount of net capital liabilities per mile of track, are obtained, with respect to most individual companies and with respect to all state and national totals, by dividing the amount of trackage owned (not the amount operated) into the net capitalization, as ascertained by deducting from the sum of the capital stock and funded debt outstanding the value of securities of other reporting railways held and the value of other outside investments, the value being in each case that at which these securities or investments are carried in the balance sheets of the holding companies, design-

nated as "other permanent investments," in the Census schedule.¹ Much the larger part of the "other permanent investments" reported by all the companies combined represents the stocks and bonds of other reporting railways.

In many instances where street railways have been combined, either through stock ownership or through lease, the controlling company makes capital expenditures upon the lines of the subsidiary companies. The capitalization of the operating company may, therefore, appear exceedingly large in proportion to the trackage which it directly owns, being based in part on trackage of the subsidiary companies. On the other hand, the capitalization of the latter does not represent in such cases the total investment upon their lines. One of the most conspicuous illustrations of this situation is found in the Third Avenue system in New York. The Third Avenue Railroad Company itself has capital stock and funded debt outstanding to the amount of \$55,995,800, while it owns outright only 27.24 miles of track. But the company owns \$10,455,290 of the securities of its eight subsidiary companies, and, moreover, has advanced to them \$11,383,476 for construction work. The capital stock and bonds of several of these companies are much less in amount than their cost of construction. The system as a whole has 230.73 miles of track, and the net capital liabilities are \$269,142 per mile. In cases of this sort the parent and subsidiary companies have been treated as one system in computing the ratio of capital liabilities to the trackage, and any duplication of capital stock or funded debt due to the ownership of securities of one company by another has, as in other cases, been eliminated.

Capitalization of companies, classified according to power.—Table 20 is a summary of the statistics of capitalization for all street and electric railways and also for these railways classified according to power.

¹Strictly speaking, the net capitalization should be computed by deducting the par value of the securities of other street railways held, but this figure was not called for in the schedule.

TABLE 20.—CAPITALIZATION OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	Total.	ELECTRIC, SURFACE.				Animal.	Steam and electric, elevated.	Cable, surface and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.					
Number of companies.....	980	724	121	58	54	6		14	3
Track mileage.....	22,389.04	18,662.29	2,464.19	831.17	156.12	228.10		33.11	12.06
Capital stock outstanding, amount.....	\$1,315,572,960	\$1,072,946,092	\$116,777,854	\$20,751,900	\$5,469,114	\$95,531,600		\$4,000,500	\$95,900
Preferred.....	127,930,179	91,077,179	21,644,900	1,500,000		13,708,100			
Common.....	1,187,642,781	981,868,913	95,132,954	19,251,900	5,469,114	81,823,500		4,000,500	95,900
Per mile of track.....	56,760	57,493	47,390	24,967	34,568	418,815		120,825	7,952
Funded debt outstanding, amount.....	992,709,139	787,783,776	102,753,197	19,260,994	4,647,923	76,125,050		2,028,200	110,000
Per mile of track.....	44,339	42,213	41,699	23,173	29,395	333,735		61,256	9,121
Total capital liabilities.....	2,308,282,099	1,860,729,867	219,531,051	40,012,894	10,117,037	171,656,650		6,028,700	205,900
Investments in securities and nonrailway property.....	152,513,997	141,665,456	9,267,550	927,200	107,723	92,390		453,676	
Net capital liabilities.....	2,155,768,102	1,719,064,409	210,263,501	39,085,694	10,009,314	171,564,260		5,575,024	205,900
Per mile of track.....	96,287	92,114	85,328	47,025	63,302	732,145		168,379	17,073

¹Exclusive of reports for 7 companies, having 134.98 miles of track, which failed to furnish this information, and exclusive of 52.97 miles of track leased from steam railway companies.

²Includes floating debt in the case of 7 companies which have not yet issued funding bonds.

The total authorized capital stock and funded debt of street and electric railways of the United States in 1902 was \$2,870,629,316. Of this amount, \$2,308,282,099, or 80.4 per cent had been issued and was outstanding at the end of the fiscal years covered by the various reports. This is exclusive of floating debt except in the case of 7 companies which have not yet issued intended funding bonds. Of the total outstanding capitalization, \$532,813,318 represents the securities of lessor companies, \$332,603,890 of this sum being stock and \$200,209,428 bonds.

The total outstanding capital liabilities of companies operating primarily electric surface railways, including part-time roads, amounted to \$2,120,273,812, or 91.9 per cent of the total outstanding capital liabilities for all street and electric railways. Most of the remaining capitalization is represented by elevated railways.

Of the total capital liabilities outstanding, capital stock constitutes 57 per cent and funded debt 43 per cent. The proportions which the two classes of securities bear to one another differ only slightly as between electric, animal power, and elevated railways. The great majority of the railway companies have funded debts, and in many individual instances, the amount of funded debt considerably exceeds the amount of capital stock. The United Railways and Electric Company, of Baltimore, Md., for instance, has \$15,073,306 of stock and \$51,381,694 of bonds; the Metropolitan Street Railway Company, of Kansas City, has \$5,636,800 of stock and \$16,038,400 of bonds.

The amount of preferred stock outstanding is a little less than one-tenth of the total amount of capital stock. Only 85 companies have preferred stock. Nearly all of these companies also have bonds. None of the animal power or cable railways has issued preferred stock.

The total amount of investments of street railway companies, in securities and nonrailway property, aside from the investments in the railways which they own and in electric light and power plants, as carried in the balance sheets of the companies, is \$152,513,997. Nearly all of these outside investments are held by companies operating primarily electric surface railways. Deducting the value of these investments, there remains, as the net capitalization represented by the railway and electric property of street railway companies, \$2,155,768,102.

Capitalization per mile of track.—The combined total capital stock and funded debt of all street and electric railway companies is equal to \$103,099 per mile of track owned by them. When the value of "other permanent investments" is deducted the net capital liabilities per mile of track are \$96,287. The net capitalization of those companies which operate primarily electric surface railways and which do no commercial lighting amounts to \$92,114 per mile of track. From one standpoint this sum exaggerates slightly the capitalization of electric surface railways proper. For

among the companies included are two, Brooklyn and Boston, which have a considerable mileage of elevated track, and several which have cable trackage in addition to their electric lines. Elevated railways and cable railways cost much more to build than the ordinary overhead trolley surface lines. The average capitalization of the exclusively elevated railways in 1902 was \$752,145 per mile of track and that of cable railways, including inclined planes, \$168,379. Even the exclusively animal power railways show an exceedingly large capitalization per mile of track. An examination of the returns of separate companies, however, shows that \$8,960,000, or nearly nine-tenths of the total capital liabilities of these animal power railway companies, have been issued by four companies in New York city, which own only 30.82 miles of track. On the average these four companies are capitalized at \$288,556 per mile. The average capitalization of the remaining 50 animal railway companies in the United States is about \$8,000 per mile of track.

The figures of capitalization per mile of track just given appear at first glance very large. They greatly exceed the capitalization per mile of the steam railways of the country. The Interstate Commerce Commission itself computes the relation of capitalization to trackage for such railways only on the basis of the length of line—that is, of first main track—nor does it make deduction of the amount of securities of other reporting railways held by the companies. The report of the Interstate Commerce Commission does not show the actual length of all railway tracks in the country. It does show the number of miles of track operated, including second tracks, sidings, switches, etc. This figure (274,195 miles in 1902) is several thousand miles greater than the mileage constructed, by reason of duplication, in the statistics of track operated under trackage rights. On the basis of track operated the total capital liabilities of steam railways in 1902 (\$12,134,182,964) were equal to about \$45,000 per mile of track. But in order to render the figures comparable with those for street railways it is necessary to deduct the large amount (\$2,208,518,793) of stocks and bonds of reporting railways which are held by other railway companies. With this deduction the net capitalization of steam railways would be about \$36,000 per mile of track.¹

The enormous increase in the capitalization of street railways per mile of track since 1890 has already been pointed out (page 11). It is not within the scope of this report to enter into a detailed discussion of the question whether or to what extent the street and electric railway companies of the United States may be overcapitalized. To do so would involve a consideration of unofficial estimates of cost of construction, which vary greatly in individual instances. It may be of value, however, to present a few general considerations regarding capitalization, which may aid in the interpretation

¹ See Statistics of Railways in the United States, 1902, pages 15, 17, and 54.

of the statistics just presented. The subject of the relation between capitalization and actual investment in the street railways is a very important one from the standpoint of the general public. Upon it hinges largely the question of the reasonableness of street railway fares and the question of taxation. Information regarding the amount of current expense necessary to carry a passenger can readily be secured. For the United States as a whole, the margin between operating expenses and fares averages a little more than 2 cents per passenger, while in the case of several important railways the margin is fully 2½ cents per passenger. (See page 86.) Though from this margin must be deducted an amount to cover the depreciation of property and taxes, much the greater part constitutes a net return to capital. The amount of dividends and interest actually going to stockholders and bondholders, taking the street railways of the country as a whole, represents less than the current rate of interest on an amount equal to the face value of their outstanding securities. Few companies pay a high rate of dividend. If the capitalization of the street railways of the country represented real value, dollar for dollar, earnings might appear to be not too great, but too small. The question of the reasonableness of profits thus becomes primarily one as to that of capitalization.

It is quite impossible to obtain accurate information as to the actual amount of money which has been spent in the construction and equipment of street railways in general or of most individual street railways. The item, "cost of construction," as carried on the books and balance sheets of street railway companies gives, in most cases, no idea whatever of the cash investment. The intervention of construction companies composed of the promoters of the railway has in many cases rendered the book value of properties misleading, and other similar reasons might be given. The most important difficulty, however, is that the greatest railway systems now existing have been built up by combination and recombination. The cost which a company enters upon its books when it buys another system is the amount of cash or securities which it has paid for the going concern. This amount is based upon the earning capacity, largely, if not wholly, irrespective of original cost. The records of cost of the absorbed companies are no longer accessible, and even if they were would probably not show correctly the actual investments. Estimates of engineers regarding the cost of construction hold good only for the conditions of the given time and place, and may be very far from correct as applied to the great majority of existing railways.

Causes tending to increase capitalization.—There are many causes which have tended to increase the capitalization of street railways during recent years. The cost of the roadbed of street railways is greater than is

ordinarily supposed and has increased very materially under change from horse traction to electric traction.

Steam railways must incur large expense for grading, for making cuts and fills, for bridging streams, and tunneling mountains. Street railways, in most instances, are built on streets and roads already graded; they largely make use of public bridges and seldom have need of tunnels. Even in the case of urban railways, however, the foundation and roadbed, aside from the rails, involve much expense, particularly in the large cities, where the construction is often immensely superior to that in small towns. The heavier cars which have come into use have necessitated the most careful and expensive methods in the preparation of the foundations for tracks. In cities street railways are required, ordinarily, to pave the streets between their tracks and for a short distance on either side. The expense thus incurred is often greater than the cost of the rails themselves and greater than the cost of grading for steam railways under ordinary circumstances. The recent estimate of Mr. B. J. Arnold, regarding the cost of duplicating the Chicago street railway system, places the expense of paving at from \$6,808 to \$18,400 per mile of track, according to the character of pavement used.¹ Of course railways in small towns and many of the lighter interurban railways, particularly of those which are laid in or at the side of the country roads, have been subject to much less expense for grading, foundations, and paving than the best railways in the great cities. On the other hand, the highest type of electric interurban railway, operating on a private right of way, has a roadbed nearly if not quite as perfect and as expensive as that of steam railways in the same section of the country.

In the days of horse railways, the rails used were light in weight, often less than 40 pounds per yard. Nowadays the more important street railways in the cities, as well as the best fast interurban lines, are using rails of from 80 to 120 pounds weight per yard. These rails are heavier than those employed on a large proportion of the steam railway trackage. All the special work which accompanies the track has similarly increased in weight and in cost. To the cost of the track must be added that of overhead electric construction, an element of expense wholly lacking in the case of horse and steam railways. Underground trolley and cable construction are much more expensive still. The rolling stock of the modern electric railway costs far more than that of the old horse railway; the cars are larger, heavier, more comfortable, and more elegant; the motors cost far more than the horses which formerly hauled the cars; and the modern power house is a new and important source of capital expenditure.

Reconstruction in relation to capitalization.—One of

¹See Report on Chicago Transportation Problem, 1902, page 192. The cost of macadamizing is put at \$3,450 per mile.

the most important points to be borne in mind, in considering capitalization of street railways, is the cost involved in the reconstruction which has been necessitated by progress in methods. It is a fact sometimes overlooked that the tracks and equipment of the old-fashioned horse railways had practically to be thrown away when cable or electric traction was introduced, and that, in most cases, the expense of the new system was almost as great as it would have been had there been no previous railway whatever. The capitalization of the different kinds of street railways in 1890 can not be segregated accurately, but it is probable that the horse lines were represented by securities to the amount of fully \$250,000,000, much the greater part of which was based on property that has since become valueless.

The cable railways which existed in 1890 have to a great extent been changed to electric operation, this being true even of two or three important cable lines completed since 1890. A considerable fraction of the large investment in cable railways has been destroyed by the change. The power houses, cables, and grips have been virtually thrown on the scrap heap; the subways in which the cables ran, the cost of which was very great, have been wholly abandoned in many instances; while in other instances the expense of reconstructing them for the use of the underground electric trolley, which has been done extensively in New York and Washington, is much greater than is ordinarily supposed. Mr. B. J. Arnold, in his report to the Chicago city council, declared that it would cost nearly as much to convert the cable lines of that city to the underground trolley system as to construct the latter at first hand. The expense, as indicated in the report, would depend largely upon the size of rails and the strength of conduit yokes used under the cable system. If, as in Chicago, heavier construction should be necessary to bear the strain of modern cars and speeds, the old work would be of little value.¹

So, too, the change from steampower to electricity, particularly on the elevated railways of New York and Brooklyn, involved a great waste of capital.

Finally, many street railway companies have, even within the short time since electric traction was introduced, largely reconstructed their plants and equipment. The earlier motors, notwithstanding their high cost, proved insufficient in power and unsatisfactory in other ways. They have for the most part been replaced, and, in many instances, even these new motors have again been replaced. The small cars, unsuited to high speed, have given way to larger ones. The foundations of the roadbed and the tracks have had to be reconstructed and strengthened in many cases to meet the requirements of larger cars and increased speed. Even more conspicuous, perhaps, have been the replacements of the engines and dynamos in the power houses.

Changes of this sort result in greater economy of operation, and are usually profitable to the railway company even when the interest on the new investment is taken into account; but they have of necessity greatly increased the aggregate expenditure for construction and equipment. The railways, as they stand, have cost much more than they would cost if constructed *de novo* at the present time.

It is not true, however, that all street railways have been thus compelled to abandon or reconstruct properties representing large investments of capital. Most of the fast interurban railways have been built since the methods of construction and equipment were highly developed and have required as yet little reconstruction. Many railways in the smaller towns and cities, as well as a considerable part of the trackage even in large municipalities, date likewise from a recent period. In fact, as appears from Table 21, the capitalization of many of these newer railways is very much less per mile than that of older systems in large cities. No opinion is here expressed as to whether the present capitalization of street railways generally, or of any particular railway, corresponds to the total amount of money which has been actually invested in its present and past properties taken together. Attention is merely called to the fact that, taking the country as a whole, the aggregate waste of capital involved in the progress of street railway methods has been great. That waste must particularly be borne in mind in considering the capitalization of many individual companies.

The question at once occurs, however, to what extent property which has become valueless should continue to be represented by securities and to earn interest or dividends. It is commonplace in accounting that a certain amount should be charged annually against earnings, to cover, not merely depreciation arising from ordinary wear and tear, but also the probable depreciation arising from progress in methods. Street railway companies ought, of course, to be permitted to charge fares high enough to provide for such a reasonable depreciation allowance. Under proper accounting the net capitalization represented by depreciating property is thus gradually reduced, and the amount required from earnings for dividends and interest is correspondingly lessened. Doubtless, in many cases, street railways have in the past earned profits high enough to enable them to make such depreciation allowances if they had seen fit to do so. Their policy, however, almost without exception, has been to pay out the greater part of net income in dividends, although a surplus is often invested in the construction of extensions to old lines. Had correct accounting methods been pursued, the capitalization of many horse railways would have been completely written off by the time electric traction had rendered the plants valueless.

During the years since electricity was introduced,

¹ Report on the Chicago Transportation Problem, 1902, page 158.

changes in methods on many railway systems have been so rapid, and capital has been expended so fast, that it would have been impossible to make a depreciation allowance sufficient to write off the waste capital within the period of time during which it existed, without practically excluding the possibility of interest and dividends. Moreover, sufficient experience had not been accumulated, at least during the earlier years of electric traction, to enable accountants to determine what would be a reasonable allowance for depreciation. In instances where property is being replaced so rapidly it seems reasonable that the capitalization should be temporarily increased beyond the sum which would be necessary to construct the improved railway system from the beginning. But it seems equally reasonable

that such capitalization, in excess of the cost of reproducing the properties, should thereafter be reduced as rapidly as possible by the accumulation of a depreciation fund. There is little probability that such sudden and great changes in methods will be necessary in the future as in the immediate past, and it will be possible hereafter to estimate depreciation better and to provide for it. Permanently to demand interest and dividends on securities issued for properties no longer in existence is unjustifiable.

Capitalization of companies, classified according to population.—Table 21 shows the statistics of capitalization of street and electric railways in urban centers, classified according to population, together with the two groups of interurban railways.

TABLE 21.—CAPITALIZATION OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	940	142	57	102	321	60	298
Track mileage.....	22,389.04	4,981.50	3,531.02	2,907.13	2,240.24	2,766.23	5,962.92
Capital stock outstanding, amount.....	\$1,315,572,960	\$678,097,721	\$236,338,265	\$111,533,632	\$50,096,219	\$78,673,375	\$160,843,748
Preferred.....	127,930,179	66,870,006	20,650,000	18,276,137	2,004,581	6,932,475	13,196,980
Common.....	1,187,642,781	611,227,715	215,688,265	93,257,495	48,091,638	71,740,900	147,646,768
Per mile of track.....	58,790	136,123	66,982	38,366	22,358	28,441	26,974
Funded debt outstanding, amount.....	992,709,139	488,648,145	167,314,210	77,858,913	39,341,284	68,615,080	150,931,507
Per mile of track.....	44,339	98,093	47,384	26,782	17,561	24,805	25,312
Total capital liabilities.....	2,308,282,099	1,166,745,866	403,652,475	189,392,545	89,427,503	147,288,455	311,775,255
Investments in securities and nonrailway property.....	152,513,997	124,803,819	4,556,993	5,671,304	3,301,516	2,416,934	11,763,431
Net capital liabilities.....	2,155,768,102	1,041,942,047	399,095,482	183,721,241	86,125,987	144,871,521	300,011,824
Per mile of track.....	96,287	209,162	113,026	63,197	38,445	52,371	50,313

¹ Exclusive of reports for 7 companies, having 134.98 miles of track, which failed to furnish this information, and exclusive of 52.97 miles of track leased from steam railway companies.

This table shows that of the total capital liabilities outstanding, which amount to \$2,308,282,099, a trifle more than one-half has been issued by the railways in cities of more than 500,000 population, and an additional one-sixth by railways in urban centers of from 100,000 to 500,000 inhabitants. The capital liabilities of the fast, long interurban railways amount to \$147,288,455.

The proportions of the total capitalization represented by capital stock and funded debt do not greatly differ as among the four groups of urban centers, the bonds in each group being approximately three-fourths as great in amount as the stocks. On both classes of interurban railways the bonds are equal to about nine-tenths of the capital stock. In recent years street railway companies have become more and more disposed toward the issue of bonds. (See comparison with 1890, page 11.) Interurban railways, which are mostly of recent origin, reflect this tendency in their large proportion of bonds to stock.

The investments of companies in securities and property outside of the street railway plants themselves and lighting plants are most conspicuous in the largest cities. This is explained by the fact that in the process of combination among railways in these great centers the securities of certain companies have become in large amounts the property of other companies.

Capitalization of full-time electric surface railways without commercial lighting, classified according to population.—Table 22 presents similar classified statistics of capitalization for those street railway companies which operate primarily electric surface railways, without commercial lighting, and which operated throughout the census year.¹

¹ Companies operating only part of the year are excluded merely in order that the table may represent the same companies for which statistics of operation and income are elsewhere presented. Obviously, the fact that a railway has been only recently constructed and has not operated a full year does not ordinarily affect its capitalization.

STREET AND ELECTRIC RAILWAYS.

TABLE 22.—CAPITALIZATION OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	724	122	48	85	172	46	251
Track mileage.....	18,602.29	4,701.99	3,222.74	2,159.26	1,359.51	2,162.62	5,056.17
Capital stock outstanding, amount.....	\$1,072,946,092	\$576,716,121	\$203,688,065	\$74,375,407	\$27,238,266	\$61,210,375	\$129,717,858
Preferred.....	91,077,179	53,161,906	14,350,000	9,726,237	934,581	4,832,475	8,071,990
Common.....	981,868,913	523,554,215	189,338,065	64,649,170	26,303,685	56,377,900	121,645,878
Per mile of track.....	57.493	122,654	63,203	34,445	20,035	28,304	25,555
Funded debt outstanding, amount.....	787,783,775	407,295,222	144,608,710	44,719,913	19,430,843	51,717,580	120,011,507
Per mile of track.....	42.213	86,622	44,871	20,711	14,293	23,914	23,736
Total capital liabilities.....	1,860,729,867	984,011,343	348,296,775	119,095,320	46,669,109	112,927,955	249,729,365
Investments in securities and nonrailway property.....	141,665,458	124,603,706	3,132,821	2,672,870	780,169	2,219,093	8,256,799
Net capital liabilities.....	1,719,064,409	859,407,637	345,163,954	116,422,450	45,888,940	110,708,862	241,472,566
Per mile of track.....	92.114	182,775	107,103	53,918	33,754	51,192	47,758

¹ Exclusive of reports for 7 companies, having 134.98 miles of track, which failed to furnish this information, and exclusive of 52.97 miles of track leased from steam railway companies.

The most significant fact brought to light by this table is that the capitalization of full-time electric surface railways without commercial lighting is very much greater in proportion to their trackage in large urban centers than in small ones. The average net capital liabilities of such street railways in centers of more than 500,000 population is no less than \$182,775 per mile of track, or about five times as great as the net capitalization per mile of track of the steam railways of the United States. (See page 46.) For centers of 100,000 to 500,000 inhabitants the capitalization of railways of this class is \$107,103 per mile; for centers of 25,000 to 100,000 inhabitants it is \$53,918 per mile; and for those of less than 25,000 population, \$33,754. The average capitalization of fast, long interurban railways is \$51,192 per mile of track, and that of other interurban railways \$47,758.

These averages include widely varying ratios of capitalization to trackage as among the different companies in each population group. Table 23 shows the number of companies in each group whose net capital liabilities fall within the limits specified.

TABLE 23.—Distribution of full-time electric surface railway companies, without commercial lighting, in the several urban and interurban groups, according to capitalization per mile of track: 1902.¹

NET CAPITAL LIABILITIES PER MILE OF TRACK.	NUMBER OF COMPANIES.						
	Total.	Urban centers, population.				Interurban railways.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Total.....	566	48	37	69	169	40	203
Under \$25,000.....	196	5	2	13	80	4	92
\$25,000 but under \$50,000.....	184	8	2	26	60	22	66
\$50,000 but under \$75,000.....	87	9	7	16	20	9	25
\$75,000 but under \$100,000.....	35	6	5	5	5	3	11
\$100,000 but under \$150,000.....	35	2	18	6	2	2	5
\$150,000 but under \$200,000.....	10	6	1	.....	1	.....	2
\$200,000 but under \$300,000.....	10	8	1	1	.....	.....	.....
\$300,000 and over.....	9	4	1	2	1	.....	1

¹ Exclusive of reports for 6 companies which failed to furnish this information.

This table includes only primarily electric surface railways, without commercial lighting, operating the entire year. Lessor companies are omitted except where, as in several important cases, their capitalization and trackage are combined with those of operating companies. While only 12 of the 48 companies in urban centers of more than 500,000 inhabitants show a net capitalization exceeding \$200,000 per mile of track, these 12 companies have 2,246.17 miles of track, or more than half of the total for all operating companies in the group. Six other companies in this group report more than \$150,000 per mile of track. In urban centers of 100,000 to 500,000 inhabitants only 3 companies report more than \$150,000 per mile of track. Half the companies in cities of this size have between \$100,000 and \$150,000 of net capital liabilities per mile of track, and these companies own much more than half of the total trackage of operating companies. In urban centers of 25,000 to 100,000 population, only 14 out of 69 companies have a net capitalization exceeding \$75,000 per mile of track. The largest group of companies in cities of this size comprises those reporting from \$25,000 to \$50,000 per mile. Of the 169 companies in the smallest urban centers, only 29 have more than \$50,000 of net capital liabilities per mile of track, and nearly half report less than \$25,000. More than half of the fast, long interurban railways fall within the group having from \$25,000 to \$50,000 of net capitalization per mile of track. Very few of the many "other" interurban companies report more than \$75,000 per mile of track, and 92 of them report less than \$25,000 per mile.

While there is thus no uniformity in the relation of capitalization to trackage in cities of a given group, the classified statistics of Table 23 show that the averages for the groups presented in Table 22 give a roughly correct idea of the capitalization of a large proportion of the trackage in the several population groups.

The enormous disproportion between the capitalization of street railways in urban centers of different population is attributable, at least in part, to differences

in cost of construction. It may be noted in the first instance that in cities of more than 500,000 population several important companies which operate predominantly electric surface railways operate also in part more expensive forms of trackage. Thus, such companies in Brooklyn and Boston have nearly 90 miles of elevated structure; while in Chicago and San Francisco they operate more than 90 miles of cable railway. In New York city there are about 180 miles of track with underground electric conduit. Each of these kinds of construction costs necessarily very much more than the overhead trolley construction. However, the total trackage of these three classes owned by primarily electric surface companies in cities of more than 500,000 population is only about one-thirteenth of their trackage. Even if a liberal allowance of additional capitalization be made for the more expensive systems, the securities remaining as strictly attributable to the overhead trolley surface railway trackage (including therewith 82.08 miles of horsepower railway in New York and Chicago) in cities of the first group would probably still be approximately \$175,000 per mile of single track.

Various causes have tended to make the cost of ordinary overhead trolley railways higher in centers of more than 500,000 population than elsewhere. The traffic is much heavier per mile of track than in smaller places, and the road must, therefore, be equipped with more cars; the expense for power houses and for car barns is much greater per unit of track than in cities where the traffic is less dense; the track, being subjected to more severe strain than elsewhere, is in general more expensively constructed, with deeper and stronger foundations and heavier rails; and the cost of paving is likewise greater.

Perhaps the most important factor tending to increase the amount of capital expended in street railway construction in the great centers of population is the fact that there, more than anywhere else, public demand has compelled speedy adoption of improvements in methods, resulting in extensive reconstruction and replacement. It was mostly in the larger cities that horse railways were developed and abandoned. It was chiefly there, too, that cable traction superseded horse traction, only to be itself soon displaced in most instances by electricity. Changes in methods of operation in these cities have had, in many cases, to be accomplished without the interruption of traffic, thus increasing the cost of reconstruction.

As the expense of constructing street railways has been greater in centers of more than 500,000 population than in those of any other class, so, doubtless, railways in centers of from 100,000 to 500,000 inhabitants have cost more than those in the centers of the next smaller size, and the latter in turn more than railways in the smallest urban centers. Whether these variations in cost are sufficient to explain altogether the

wide differences in the ratio of capitalization to trackage is a question that can not be fully discussed in this report. It may be observed, however, that the temptation to overcapitalize is stronger in the great cities, for the margin of earnings over operating expenses is greater in such cities than elsewhere. In smaller cities, or on interurban railways, the profits of the business are frequently scarcely enough to pay interest on the bare cost of construction. Under such circumstances the issue of securities beyond that cost would find its motive almost solely in the hope of future increase in earning capacity.

Capitalization, by states.—Statistics showing for each state the amount of capital stock and funded debt authorized and issued, and the relation of the net capitalization of street and interurban railways to their trackage, will be found in Table 93. The capitalization per mile of track shows wide differences between states. Careful analysis will furnish a partial explanation of these differences. The ratio of capitalization to trackage would naturally be greatest in those states where the largest proportion of the trackage is situated in great cities. Moreover, in some states there is a much larger proportion of the expensive elevated, cable, and conduit trolley railway than in others.

Comparisons are often made between the capitalization of street railways in Massachusetts and in other states. In Massachusetts the issue of securities by street railway companies is closely regulated by law and by the State Railway Commission.¹ The net amount of capital stock and funded debt of the street railways of that state, according to the present investigation, amounted to only \$39,067 per mile of track. Many of the Massachusetts companies have promissory notes outstanding in considerable sums, which have been issued to cover construction expenses. Even if the total floating debt of the Massachusetts railway companies be added to their stock and bonds, however, the net capital liabilities amount to only \$45,600 per mile of track. This figure may be compared with \$96,287 per mile of track, the average of the United States for all classes of companies combined. The only states which show a capitalization per mile of track lower than Massachusetts are Arizona, Arkansas, Idaho, Maine, New Hampshire, New Mexico, Vermont, and Texas. In none of these states is there a large amount of street railway trackage, and in most of them there are no cities of considerable size. On the other hand, the average capitalization of street railways per mile of track in the state of New York is \$177,532; in Maryland, \$156,142; in Missouri, \$152,206; in New Jersey, \$148,155; in Illinois, \$135,507; and in Pennsylvania, \$103,267.

In connection with the low capitalization figures for Massachusetts railways, it should be noted that the railways of that state are in a considerable measure

¹ For further description of the practice in this state see Chapter IX, Part I.

interurban in character. Most of these interurban railway companies reported less than \$20,000 of capital per mile of track. Their trackage has been built, for the most part, on the public highways and at a comparatively low cost, a cost much less than that of the fast, long interurban lines more recently built, particularly in the middle Western states, and much less than that of railways in large cities.

In the case of every state where the street railways have an average net capitalization of more than \$100,000 per mile of track, a larger proportion of the trackage lies within the limits of great cities than is the case in Massachusetts. In Illinois and New York a large amount of elevated, cable, and conduit trolley trackage is included in the average, while Massachusetts railways are, with the exception of 16 miles of elevated track in Boston and 25.43 miles operated on the third-rail system, purely of overhead electric trolley construction. It is highly probable, however, that the street railways of Massachusetts are more conservatively capitalized than

those of most other states. The figures from which the average for that commonwealth is drawn include the excellent Boston system and other very satisfactory systems in the medium-sized cities of the state.

Capitalization of surface railway companies in urban centers of more than 100,000 inhabitants.—Table 24 shows the net capital liabilities of surface street railways in each urban center of more than 100,000 population, together with the relation between capitalization and length of track. The table includes all companies operating surface railways predominantly, whether by electric, cable, or animal power. The five strictly elevated railways have been excluded. As an aid to the interpretation of the relation between capital liabilities and trackage, the length of each class of trackage in each city is indicated. The statistics of Milwaukee, Wis., St. Joseph, Mo., and Toledo, Ohio, are not exactly comparable with those of other cities, since in these three cases the railway companies also operate lighting plants.

TABLE 24.—CAPITALIZATION OF SURFACE RAILWAY COMPANIES IN INDIVIDUAL URBAN CENTERS OF 100,000 POPULATION AND OVER: 1902.

NAME OF CENTER.	Population.	TRACK MILEAGE.					Net capital liabilities.	Net capital liabilities per mile of track.
		Total.	Electric.	Animal.	Cable, surface and inclined planes.	Steam, surface.		
Albany, N. Y.	216,530	75.83	74.83	1.00			\$9,150,762	\$120,675
Baltimore, Md.	510,288	365.12	365.12				66,455,000	182,009
Boston, Mass.	927,994	451.68	451.68				43,972,299	97,353
Buffalo, N. Y.	421,694	320.48	320.48				25,920,923	87,076
Chicago, Ill.	1,769,951	925.28	826.82	6.76	91.70		99,951,396	109,537
Cincinnati, Ohio.	429,137	263.57	261.46	1.50	0.61		27,583,430	104,653
Cleveland, Ohio.	405,359	237.04	237.04				26,916,724	113,554
Columbus, Ohio.	127,022	106.43	106.43				11,605,000	109,089
Denver, Colo.	133,859	149.77	149.77				10,837,000	75,377
Indianapolis, Ind.	169,164	109.86	109.86				14,742,260	134,191
Jersey City, N. J.	969,735	463.54	462.14		1.40		102,156,242	220,383
Kansas City, Kans.	237,042	181.24	148.24		33.00		21,659,200	119,506
Los Angeles, Cal.	118,746	164.16	154.86		4.85	4.45	12,849,500	78,274
Louisville, Ky.	204,731	147.13	147.13				12,433,372	84,506
Memphis, Tenn.	102,981	71.88	71.88				4,410,000	61,352
Milwaukee, Wis.	301,701	145.50	145.50				18,830,000	129,416
Minneapolis, Minn.	378,923	251.02	251.02				28,898,000	115,122
New Orleans, La.	287,104	180.31	180.31				22,157,000	122,883
New York, N. Y.	3,551,107	1,181.96	1,051.12	109.64	3.78	17.42	306,768,678	259,542
Oakland, Cal.	101,872	122.80	121.80	1.00			10,760,215	87,624
Omaha, Nebr.	155,268	105.95	105.95				9,500,237	89,667
Philadelphia, Pa.	1,293,697	517.53	517.53				85,436,344	165,085
Pittsburg, Pa.	640,380	469.47	464.25		5.22		86,931,900	185,170
Providence, R. I.	268,946	137.05	137.05				9,025,000	65,852
Rochester, N. Y.	178,333	95.86	95.86				9,584,887	99,988
St. Joseph, Mo.	102,979	35.15	35.15				9,100,000	258,891
St. Louis, Mo.	614,328	396.21	396.21				78,705,928	198,647
San Francisco, Cal.	344,614	276.50	177.53	5.65	80.35	12.97	38,982,225	140,985
Scranton, Pa.	155,655	76.68	76.68				8,187,410	106,774
Syracuse, N. Y.	123,776	68.16	68.16				8,351,083	122,522
Toledo, Ohio.	135,271	97.78	97.78				21,574,504	220,643
Washington, D. C.	279,940	139.67	139.67				26,036,750	186,416

¹ Includes 16.02 miles of elevated track.

² Not including capitalization of 22.80 miles leased from a steam railway company.

³ Not including capitalization of 12.79 miles leased from a steam railway company.

⁴ Not including capitalization of Denver, Lakewood, and Golden Railroad Company, having 6 miles of single track.

⁵ This company has a lighting plant, the capitalization based on which is included.

⁶ Including 67.02 miles of elevated track and 178.89 miles of conduit trolley track.

⁷ Elevated track.

⁸ Including 85.08 miles of conduit trolley track.

The table shows a certain rough parallelism between population and the amount of net capital liabilities per mile of track, though there are several conspicuous exceptions. The heaviest net capitalization is found in Greater New York, where each mile of street railway is represented on the average by \$259,542 of securities. It will be observed that a considerable amount of the

trackage of the Brooklyn Rapid Transit Company, which is included in the table, is elevated, and that some of the other New York companies have much underground trolley track. The net capitalization of the Interurban Street Railroad Company in New York, combined with that of the subsidiary companies which it directly operates (excluding the Third avenue lines

and several others which the Interurban controls in other ways), represents an average of \$494,399 per mile of track owned by these companies, the highest average reported for any important surface railway system. This system comprises 198.74 miles of track, of which 131.13 miles is operated by conduit trolley. Nearly all the rest of the trackage, however, is operated by animal power. The capitalization of this system may be contrasted with that of the railways of the city of Washington, two-thirds of whose trackage is of the underground conduit type, which are capitalized at \$186,416 per mile. It must be noted, however, that the lighter traffic of the Washington railways permits a smaller investment per mile in equipment than is required for the denser traffic of the Interurban railway; and again, that the Interurban company has converted to electric traction a larger amount of cable trackage than ever existed in Washington. Other causes, already mentioned, which tend to increase the cost of construction of street railways in the greatest cities, apply with special force to New York.

Several cities, however, in which only overhead trolley construction prevails, report a very high ratio of net capitalization to trackage. The railways in the great urban center in northern New Jersey are capitalized at \$220,383 per mile; those of St. Louis, at \$198,647; those of Pittsburg, at \$185,170; those of Baltimore, at \$182,009; and those of Philadelphia, at \$165,085. These figures contrast strikingly with the capitalization of the railways of Boston and the adjoining municipalities, which amounts to only \$97,353 per mile of track. The capitalization of the Boston lines is indeed less in proportion to the trackage than that of railways in most smaller cities of more than 100,000 population. This urban center is fifth in point of size in the United States, and its leading railway system is quite equal in its physical characteristics to that in any of the other cities just named; moreover, the system includes 16 miles of elevated track. It carries more passengers per mile of track than the railways in any of the other five centers

mentioned except Philadelphia. The trackage is almost altogether located within strictly urban areas. There has perhaps, however, been less reconstruction and waste of capital in Boston than in some of the other leading cities, especially in New York.

Notwithstanding the fact that there is a considerable amount of costly cable trackage in Chicago, the ratio of the net capitalization of surface street railways in that city to their trackage is less than that of most cities of more than 200,000 population, amounting to \$109,537 per mile of track. The most extensive surface system in Chicago, however, the Union Traction Company, has net capital liabilities, including that of lessor lines, of \$268,577 per mile. The comparatively low average for the city is partly accounted for by the fact that the Chicago City Railway Company, with 222.5 miles of track, has kept its capitalization at the relatively conservative figure of \$18,000,000, or \$80,899 per mile. Moreover, there are several Chicago companies which operate in the thinly settled parts of the city and its suburbs, where the cost of construction is much less than in the heart of the city.

The amount of net capital liabilities per mile of track in most of the cities of from 100,000 to 500,000 population is between \$100,000 and \$150,000. The only cities of this size which show a capitalization of less than \$100,000 per mile are Buffalo, N. Y.; Denver, Colo.; Los Angeles and Oakland, Cal., the companies in all of which cities operate a large amount of interurban and suburban trackage; and also Louisville, Ky.; Omaha, Nebr.; Memphis, Tenn.; Providence, R. I.; and Rochester, N. Y. The lowest ratio of net capitalization to trackage is reported for Memphis, but the railways of that city were in the hands of a receiver at the time of the census investigation and part of their securities had been wiped out of existence. The street railways of San Francisco, Cal., which have about one-third of their trackage operated by cable, are capitalized at \$140,985 per mile of track.

CHAPTER V.

FINANCIAL OPERATIONS.

Of the 817 operating street and interurban railway companies 18 failed to furnish information regarding their financial transactions. These 18 companies operated 378.9 miles of track, about 1.7 per cent of the total mileage. The names of these companies are shown below, together with their mileage and the number of passengers carried by them.

Companies that failed to report data regarding financial transactions.

STATE.	Name of company.	Miles of single track.	Fare passengers.
Total		378.90	44,280,436
Arizona	Phoenix Railway Company	12.00	750,000
Colorado	Boulder Railway and Utility Company	4.08	(¹)
Connecticut	New York, New Haven and Hartford Railroad Company, New Canaan Branch.	8.63	204,900
Connecticut	New York, New Haven and Hartford Railroad Company, Berlin system.	25.89	1,645,008
Illinois	South Chicago City Railway Company	38.42	4,532,047
Illinois	Galesburg Electric Motor and Power Company.	17.00	1,750,000
Indiana	Hammond, Whiting and East Chicago Company.	24.90	1,956,616
Kansas	Kansas City-Leavenworth Electric Railway Company.	39.00	(¹)
Massachusetts	New York, New Haven and Hartford Railroad Company, Nantasket Branch.	39.33	1,039,810
New Jersey	West Jersey and Seashore Railroad Company.	19.03	5,206,304
Ohio	Wellston and Jackson Belt Railway Company.	10.50	928,925
Rhode Island	New York, New Haven and Hartford Railroad Company, Providence, Warren and Bristol Branch.	31.50	4,520,894
South Dakota	Rapid City Street Railway Company	2.00	(¹)
Virginia	South Side Railway and Development Company.	12.85	1,248,059
Virginia	Old Dominion Railway Company	12.21	(¹)
Virginia	Richmond Traction Company	18.75	6,795,946
Virginia	Richmond Passenger and Power Company.	25.21	9,517,614
Virginia	Virginia Passenger and Power Company.	37.60	4,184,313

¹ Not reported.

In the case of the four branches of the New York, New Haven and Hartford Railroad and the branch of the West Jersey and Seashore Railroad (Pennsylvania system) which are operated by electricity, as well as in the case of the Wellston and Jackson Belt Railway, which is controlled by the Hocking Valley Railroad Company, it was impossible to distinguish the financial operations from those of the controlling steam lines with any clearness. The five Virginia companies, three of which were taken over by the Virginia Passenger and Power Company during the census

year, were unable to furnish data on account of recent changes in ownership.

In considering the financial statistics it is essential to distinguish between operating and lessor companies. A complete view of the results requires separate accounts for these classes of companies, together with combined accounts for the two classes jointly. Financial statistics for 158 of the 170 lessor companies were obtained directly from the lessor companies or from the operating companies controlling them, or from other sources. The statistics for a considerable number of the lessor companies were computed from the rentals reported as paid by the operating companies, and from information obtained from street railway journals and similar sources. These figures are in a few instances approximate only.

The inquiries in the census schedule regarding the financial transactions of operating companies followed closely the standard form of accounting prescribed by the Street Railway Accountants' Association of America. The majority of the railway companies, including nearly all the more important ones, now keep their accounts in accordance with these forms. In those cases in which companies did not follow the standard form, the agents of the Bureau of the Census, in conference with the officials of the respective companies, rearranged the items of receipts and expenditures and the balance sheet entries, as shown by the books of the companies, in such a way as to conform to the requirements of the schedule. The financial statistics in general represent, therefore, precise bookkeeping records and are in no sense estimates.

I.

GENERAL INCOME ACCOUNT.

Condensed income account for operating companies, classified according to power.—Table 25 gives a condensed income account for all operating street and interurban railway companies in the United States, and also for the several classes of such railways, as based upon power used.

TABLE 25.—CONDENSED INCOME ACCOUNT FOR OPERATING COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	ELECTRIC, SURFACE.					Animal.	Steam and electric elevated.	Cable, surface, and inclined planes.	Steam, surface.
	Total.	Without commercial lighting.	With commercial lighting.	Part time.					
Number of companies	799	556	112	57	52	5	14	3	
Gross income	\$250,504,627	\$206,261,288	\$22,418,065	\$2,475,365	\$1,477,294	\$16,881,892	\$1,024,873	\$15,850	
Operating earnings	247,553,999	204,076,037	22,088,656	2,475,365	1,475,901	16,397,867	1,024,323	15,850	
Operating expenses	142,312,597	118,236,568	12,834,941	1,439,174	1,077,736	8,151,926	562,812	19,440	
Net earnings	105,241,402	85,839,469	9,253,715	1,036,191	398,165	8,245,941	471,511	23,590	
Income from other sources	2,950,628	2,185,251	329,409		1,398	434,025	560		
Gross income less operating expenses	108,192,030	88,024,720	9,583,124	1,036,191	399,556	8,679,966	472,061	23,590	
Deductions from income, total	77,596,033	65,775,778	6,007,547	560,012	362,018	4,720,135	162,104	7,159	
Taxes	13,078,899	10,831,931	733,575	50,739	71,308	1,343,547	47,245	559	
Interest, total	38,085,91	29,084,550	4,849,800	508,070	227,569	3,294,543	114,759	6,600	
On funded debt	35,223,284	26,669,877	4,619,145	435,975	164,947	3,227,427	105,913		
On other debt	2,862,627	2,414,673	230,655	72,095	62,642	67,116	8,846	6,600	
Rental of leased lines	25,518,225	25,371,536	47,413	583	63,101	35,592			
Miscellaneous deductions	912,018	487,761	377,059	620	25	46,453	100		
Net income	30,596,977	22,248,942	3,575,277	476,179	37,540	3,959,831	309,957	210,749	
Dividends	15,882,110	12,198,247	813,091	46,500	68,877	2,594,195	166,200		
Surplus	14,714,867	10,050,695	2,762,186	429,679	23,337	1,365,636	143,757	210,749	

¹ Exclusive of reports for 18 companies which failed to furnish this information.² Deficit.

It will be understood by anyone acquainted with book-keeping methods that an income account does not purport to show the actual cash receipts and disbursements during the year. It presents instead the receipts and expenditures properly assignable to the year's operations. Thus the items of taxes, interest, and rentals represent the amount of such obligations accrued during the year, whether wholly paid within that time or not. Similarly the item of dividends represents dividends declared during the year, no matter when paid. Money spent on capital account, moneys borrowed and repaid, and all bookkeeping duplications or transfers are omitted.

Operating earnings and gross income.—By the term "operating earnings" are designated all receipts of the companies from the actual operation of the railway property which they own, or of light and power plants connected therewith, but excluding income from sources other than railway property. The total operating earnings of the street and interurban railways reporting to the Bureau of the Census in 1902 amounted to \$247,553,999. To this must be added, to show the gross income, the income from other sources, which consists chiefly of interest and dividends on securities held by the railway companies, but which also represents, to some extent, interest on deposits of money, returns from investments in real estate not used for operating purposes, etc. A large proportion of the securities held by street and interurban railway companies are those of other such companies. The gross income of the operating street railways as a whole, therefore, includes a small amount of duplication, the earnings of certain companies becoming in part additions to the income of other companies. The gross income of all the railways, consisting of operating earnings plus income from other sources, amounted to \$250,504,627.

More than four-fifths of the aggregate operating earnings were those of full-time companies operating surface railways that were mainly electric and not operating commercial lighting plants. The operating earnings of electric railway companies having light and power plants were less than one-ninth as great as that of full-time electric surface companies without such plants. The operating earnings of the five strictly elevated railways amounted to 6.6 per cent of the aggregate for the United States. The aggregate earnings of all other classes of street railways were comparatively small, and those of the three strictly steam railways insignificant.

Distribution of income.—The net earnings from operation of all street and interurban railways, calculated by deducting operating expenses from the gross earnings from operation, were \$105,241,402. The "gross income less operating expenses," as designated in Table 25 and later tables, is made up of the net earnings from operation plus the income from miscellaneous sources.¹ It amounted to \$108,192,030 in 1902, the income from other sources constituting 2.7 per cent of this amount.

The distribution of the gross income of street and interurban railway companies among various objects differs materially among the different classes of railways distinguished in Table 25. These differences may be grasped more readily by the aid of Table 26, which shows, for each group of companies and for all companies combined, the percentages which the operating expenses and the various other items of disbursement bear to the gross income.

¹ The designation of this item in the tables and text is that adopted by the Street Railway Accountants' Association. The Interstate Commerce Commission designates the corresponding item "net earnings and income."

STREET AND ELECTRIC RAILWAYS.

TABLE 26.—PERCENTAGE DISTRIBUTION OF GROSS INCOME OF OPERATING COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric, elevated.	Cable, surface, and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.				
Gross income	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating expenses.....	56.8	57.3	57.3	58.1	72.9	48.4	54.0	122.7
Taxes.....	5.2	5.3	3.3	2.1	4.8	8.0	4.6	3.5
Interest, total.....	15.2	14.1	21.6	20.5	15.4	19.6	11.2	41.6
On funded debt.....	14.1	12.9	20.6	17.6	11.2	19.2	10.3	.....
On other debt.....	1.1	1.2	1.0	2.9	4.2	0.4	0.9	41.6
Rental of leased lines.....	10.2	12.3	0.2	(¹)	4.3	0.2	.....	.....
Miscellaneous deductions.....	0.4	0.2	1.7	(¹)	(¹)	0.3	(¹)	.....
Dividends.....	6.3	5.9	8.6	1.9	4.7	15.4	16.2	.....
Surplus.....	5.9	4.9	12.3	17.4	*2.1	8.1	14.0	*67.8

¹ Less than one-tenth of 1 per cent.

* Deficit.

It will be observed that, for all operating companies combined, operating expenses amount to 56.8 per cent of the gross income. The ratio of operating expenses to operating earnings is discussed elsewhere (pages 83 and 84). The total "deductions from income," or "fixed charges," as they are often called, amount to \$77,595,053. This sum, which is nearly three-fourths of the "gross income less operating expenses," is about 31 per cent of the gross income itself.

Taxes, licenses, and other payments to public authorities, taken together, constitute a larger proportion of gross and of net earnings than is generally supposed. These public charges in 1902 were equal to a little less than one-eighth of the gross income less operating expenses and to 5.2 per cent of the gross income. The amount going to taxes was relatively less in the case of electric railways furnishing commercial light and power than in the case of other classes of railways. This is chiefly due to the fact that companies of this type are, with a few exceptions, operating in cities and towns of moderate size where the rates of taxes are low. The taxes of the elevated railways are proportionately the highest, amounting to 8 per cent of their gross income.

The classification of taxes paid by operating companies, according to the returns of the companies, is as follows: Taxes on real and personal property, \$5,835,542, or 44.6 per cent of the total taxes; taxes on capital stock, \$2,931,252, or 22.4 per cent; taxes on earnings, \$2,719,287, or 20.8 per cent; miscellaneous taxes, licenses, and public payments, \$1,592,818, or 12.2 per cent. It may be remarked, however, that the names of the various classes of taxes in different states are not always uniform or consistent with accurate definitions. The statistics do not show to what extent the payments made by street railway companies represent a special return to the local government for franchise privileges granted. Beyond question, however, much the greater part of the payments to public authorities consists of ordinary taxes, levied upon the same basis as taxes on other forms of property or on corporations not enjoying special franchise privileges.¹

¹ A presentation of the leading requirements of laws and franchises regarding special payments for franchise privileges will be found in Part I, Chapter IX.

The items of interest on bonds or funded debt and interest on notes and other floating debt amounted, as shown in Table 25, to \$38,085,911, or no less than 15.2 per cent of the gross income, and 35.2 per cent of the gross income less operating expenses. This sum is slightly larger than the amount which street railway companies actually paid on their obligations during the census year, as a considerable number of railways failed partly or wholly to pay the interest due. In some instances, indeed, companies still owed back interest for a number of years. The balance sheets of the operating and lessor companies combined showed the total amount of interest unpaid at the end of the fiscal year 1902 to be \$14,497,670; but, as appears from the schedules, part of this represented merely accrued interest—not yet due—of wholly solvent companies, and another part represented interest due on coupons not yet presented for payment. It appears probable, however, that the greater part of the aggregate back interest reported consisted of interest which the companies could not pay. The item of interest in the income account was conspicuously large for electric railway companies furnishing commercial lighting and for elevated railways.

The great importance of the method of lease as a means of combination among street railways may be judged from the fact that the rentals paid by operating companies to lessor companies amounted to \$25,518,225 in 1902, or nearly one-fourth of the gross income less operating expenses. The rental payments are almost wholly confined, however, to companies that operate electric surface railways and that do not furnish commercial lighting.

Sinking and depreciation funds.—A noteworthy feature of the income accounts of nearly all street railways is the absence of any provision for depreciation funds or for sinking funds to redeem bonds. The total amount of "miscellaneous deductions" from income—not covered by the specified heads already mentioned—was only \$912,018, and only a fraction of this sum represented systematic appropriations to depreciation or sinking funds. In this respect the American street railway companies form a striking contrast with those in most foreign countries and an even more striking contrast with foreign municipal undertakings. American

steam railways are adopting to an increasing extent the policy of providing at least sinking funds for their funded debt.

From the standpoint of the investors it is sometimes considered preferable not to provide depreciation and sinking funds in the case of a street railway company that possesses an unlimited franchise and that operates in a city with a large and steadily increasing population. The investors in such case know that the value of their franchise is steadily appreciating and that the appreciation tends to offset any depreciation in the physical properties. They feel assured that the bonds of the company as they fall due can be renewed with little difficulty and possibly at a lower rate of interest. It may therefore be deemed wise policy to provide the capital necessary for renewals and replacements by the issue of additional securities rather than by appropriating part of the earnings for depreciation.

These considerations, however, apply with much less force in the case of many railways which are not so favorably situated or are of less modern construction, as the present properties held by them may depreciate greatly in value. In some cases a large part of the investment has been made by the issue of bonds, and when these fall due they may more than equal the value of the depreciated plant. Under such circumstances sound finance would seem to demand sinking and depreciation funds. This is still more conspicuously true of those companies whose franchises are limited to a term of years, especially if there be no provision in the franchise for compensation to the present holders for the value of their tangible properties. Delegates to the American Street Railway Accountants' Association have frequently emphasized the desirability of sinking and depreciation funds.

It may be remarked, however, that the practice of many American street and interurban railway companies, of carrying a considerable fraction of their net earnings to surplus rather than distributing them in dividends, may in some measure take the place of the systematic setting aside of depreciation and sinking funds. The net surplus of the operating street and interurban railways for the census year was \$14,714,867, which was nearly as much as the dividends declared by such companies. In many cases permanent improvements and extensions are made out of such surplus earnings. Though, usually, if the earning capacity will justify it, such expenditures are later capitalized by the declaration of a stock dividend or by some similar device, so as to raise capitalization above the actual value of the property, yet, from the standpoint of the existing owners, the method of paying for permanent improvements out of surplus amounts practically to the assignment of a part of the current earnings in a way which offsets depreciation.

Net income and dividends.—By net income is meant the amount remaining after deducting from the "gross

income less operating expenses" the various fixed charges. The combined net income of all operating railway companies in 1902 was \$30,596,977. As appears from Table 37, the total net income of the 578 companies which reported a net income amounted to \$34,352,684, while the total net deficit of the 220 companies which reported a deficit aggregated \$3,755,707. It is the difference between these sums, \$30,596,977, that is shown in Table 25 under the head of "net income."

It is scarcely necessary to point out that the net income thus calculated in no sense represents the profitability of the street and interurban railway industry. The item of net earnings is much more accurately indicative of the true profits. To understand why this is so one need only recall that interest on bonds is as truly a part of the return to street railway investors as dividends. Moreover, rentals paid to lessor companies, while they are designated as fixed charges by the operating companies, are likewise, strictly speaking, a return to street railway capital, since they become interest and dividends on the securities of the lessor companies. This point is the more obvious in those numerous cases where the operating and lessor companies are virtually owned by the same persons.

The amount of dividends paid by operating street railway companies in 1902—\$15,882,110—constituted only 6.3 per cent of their gross income and about one-seventh of the gross income less operating expenses. The proportion of dividends, exclusive of part-time railways, was least among full-time electric railway companies furnishing commercial lighting. It was much greater in the case of elevated and cable railways than among other classes. Full-time electric surface railways not furnishing commercial lighting, paid out in dividends 5.9 per cent of their gross income in 1902.

Income account for lessor companies.—Table 27 shows, for the United States as a whole, a condensed income account of the nonoperating lessor railway companies. Several of the operating companies, such as the Third Avenue Railroad Company and its affiliated lines in New York city, are leased to other operating companies at a rental fixed for the present at the amount of net income remaining after the payment of expenses and fixed charges. Such companies are included with the independent operating companies, their accounts being in precisely the same form.

The income of nonoperating lessor companies consists almost wholly of the rentals received from operating companies. These rentals usually take the form of a fixed rate of interest on the bonds of the lessor company and a fixed rate of dividend (if any) on its stocks, though in some instances the rental is a lump sum. Many operating companies treat the funded debt of their lessor companies as though it were their own direct obligation, and in their income account, class the interest thereon with other interest rather than with

rentals. The Bureau of the Census has, however, uniformly segregated the interest on the debt of lessor companies, including it with rentals in the accounts of operating companies and treating it in the accounts of the lessor companies both as an income and as an expenditure. As a matter of fact, both interest on bonds and dividends on stocks of lessor companies are frequently, perhaps usually, paid directly to the security holders by the operating company.

TABLE 27.—*Income account for nonoperating lessor companies: 1902.*¹

Number of companies.....	158
Gross income.....	\$26,134,899
Rentals from operating companies.....	26,116,884
Income from other sources.....	22,015
Deductions from income.....	8,779,294
Taxes.....	287,436
Interest on funded debt.....	8,355,677
Interest on other debt.....	20,882
Maintenance of organization and miscellaneous disbursements.....	115,299
Net income.....	17,359,605
Dividends.....	17,157,061
Surplus.....	202,544

¹Exclusive of 12 companies which failed to furnish this information.

The amount of rentals reported as received by lessor companies, \$26,116,884, does not correspond with the amount reported (see Table 25) as paid in rentals by operating companies, which was \$25,518,225. The discrepancy is due in part to imperfect information regarding lessor companies, and in part to differences in methods of accounting and in the periods covered by the reports.

The compensation paid to lessor companies for the use of their properties and franchises varies greatly. Sometimes the compensation is purely nominal, as, for instance, in a number of cases in which the lease method of control is a mere form, the securities of the lessor being, as a matter of fact, the property of the operating company. In many leases the sole compensation to the lessor company consists of the interest on its funded debt. It sometimes happens in such cases that the operating company owns part, or all, of the stocks of the lessor. The rate of rental paid to stockholders varies from a fraction of 1 per cent to as high as 72 per cent on the paid-up capital stock in the case of one lessor company in Philadelphia where only a small portion of the stock was paid up. The amount of dividends of lessor companies in 1902 was \$17,157,061.

Ordinarily the taxes on the property of lessor companies are paid by the operating companies directly, but in a few instances, by special arrangement or on account of differences in bookkeeping methods, the taxes are reported as paid by the lessor companies.

Condensed income account for operating and lessor companies combined.—Table 28 presents a combined income account of all operating and lessor companies considered as one system, and shows the result of the financial operations as they would stand if the same amount and kind of business had been done but if there were no lessor companies.

TABLE 28.—*Condensed income account for operating and lessor companies combined: 1902.*¹

Number of companies.....	957
Gross income.....	\$250,526,642
Operating earnings.....	247,553,999
Operating expenses.....	142,312,597
Net earnings from operation.....	105,241,402
Income from other sources.....	2,972,643
Gross income less operating expenses.....	108,214,045
Deductions from income, total.....	60,849,281
Taxes.....	13,366,335
Interest, total.....	46,462,470
On funded debt.....	43,578,961
On other debt.....	2,883,509
Miscellaneous deductions.....	1,020,426
Net income.....	47,364,814
Dividends.....	33,039,171
Surplus.....	14,325,643

¹Exclusive of reports for 30 companies which failed to furnish this information.

The only important differences between these figures and those for operating companies alone consist in the elimination of the item of rentals paid and in the distribution of the amount of rentals under the two heads of interest on funded debt and dividends. The distribution of the gross income of both operating and lessor companies among various objects is shown by percentages in Table 29.

TABLE 29.—*Percentage distribution of gross income for operating and lessor companies combined: 1902.*

	Percent- age.
Gross income.....	100.0
Operating expenses.....	56.8
Taxes.....	5.3
Interest, total.....	18.6
On funded debt.....	17.4
On other debt.....	1.2
Miscellaneous deductions.....	0.4
Dividends.....	13.2
Surplus.....	5.7

Regarding the operating and lessor street railways as one system, it is found that the amount of interest accrued on funded debt was \$43,578,961, which is 17.4 per cent of the gross income of all the companies, and a little more than two-fifths of the gross income less operating expenses. The net income and surplus shown in this table are not the same as would be obtained by simply adding these items for operating and lessor companies, respectively, for the reason, heretofore stated, that the income from rentals as reported by lessor companies does not precisely agree with the amount of rentals paid as reported by the operating companies. The dividends paid by operating companies and lessor companies combined amounted to 13.2 per cent of their gross income, or to 30 per cent of the income remaining after the deduction of operating expenses. The amount paid as interest on funded debt and as dividends combined, representing the total payments on the capital liabilities, is equal to 30.6 per cent of the gross income. Roughly speaking, about that proportion of each street railway fare represents the immediate return to capital invested.

Condensed income account for operating companies classified according to population.—Table 30 shows a

condensed income account for operating companies in urban centers, classified according to population, together with the similar account for fast, long interurban and other interurban railways.

TABLE 30.—CONDENSED INCOME ACCOUNT FOR OPERATING COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	799	65	47	83	312	58	239
Gross income.....	\$250,504,627	\$123,289,266	\$51,063,907	\$22,828,007	\$12,005,511	\$10,165,768	\$31,152,168
Operating earnings.....	247,553,999	120,837,007	51,008,983	22,728,795	11,879,327	10,161,736	30,938,151
Operating expenses.....	142,312,597	67,300,048	27,308,769	13,480,577	8,088,172	6,076,983	20,058,048
Net earnings.....	105,241,402	53,536,959	23,700,214	9,248,218	3,791,155	4,084,753	10,880,103
Income from other sources.....	2,950,628	2,452,259	54,924	99,212	126,184	4,032	214,017
Gross income, less operating expenses.....	108,192,030	55,989,218	23,755,138	9,347,430	3,917,339	4,088,785	11,094,120
Deductions from income, total.....	77,595,053	45,785,422	12,819,488	5,057,079	2,340,694	3,130,845	8,461,525
Taxes.....	13,078,899	7,755,582	2,608,650	823,964	340,228	248,539	1,306,936
Interest, total.....	38,085,911	14,684,921	8,712,948	3,761,836	1,938,948	2,726,608	6,260,650
On funded debt.....	35,223,284	13,683,195	8,281,098	3,492,362	1,717,822	2,557,798	6,491,009
On other debt.....	2,862,627	1,001,726	431,850	269,474	221,126	168,810	769,641
Rentals of leased lines.....	25,518,225	23,232,949	1,152,209	365,240	26,845	51,930	689,062
Miscellaneous deductions.....	912,018	111,970	345,681	106,039	34,673	108,768	204,867
Net income.....	30,596,977	10,203,796	10,935,650	4,290,351	1,576,645	957,940	2,632,565
Dividends.....	15,882,110	5,290,435	6,344,101	1,485,654	301,575	300,624	2,159,721
Surplus.....	14,714,867	4,913,361	4,591,549	2,804,697	1,275,070	657,316	472,874

¹ Exclusive of reports for 18 companies which failed to furnish this information.

The following table shows the percentage which each item of disbursement bears to the gross income:

TABLE 31.—Percentage distribution of gross income of operating companies, classified according to population: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Gross income.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating expenses.....	56.8	54.6	53.5	59.0	67.4	59.8	64.4
Taxes.....	5.2	6.3	5.1	3.6	2.8	2.4	4.2
Interest, total.....	15.2	11.9	17.1	16.5	16.2	26.8	20.1
On funded debt.....	14.1	11.1	16.2	15.3	14.3	25.1	17.6
On other debt.....	1.1	0.8	0.9	1.2	1.9	1.7	2.5
Rentals of leased lines.....	10.2	18.8	2.2	1.6	0.2	0.5	2.2
Miscellaneous deductions.....	0.4	0.1	0.7	0.5	0.3	1.1	0.7
Dividends.....	6.3	4.3	12.4	6.5	2.5	2.9	6.9
Surplus.....	5.9	4.0	9.0	12.3	10.6	6.5	1.5

As appears from Table 30 about 49 per cent of the total operating earnings of all street railways were received by the 65 companies in urban centers of more than 500,000 inhabitants. These companies, moreover, received more than four-fifths of the total amount of income from sources other than the operation of railway, light, and power plants. This unequal distribution of "income from other sources" is explained by the fact that the railway companies of the great cities, by virtue of the consolidations which have taken place, hold much larger amounts of the securities of other railway companies than are held by the companies in smaller urban centers. The operating earnings of the fast, long interurban railways amounted to \$10,161,736—about 4.1 per cent of the total for the country.

Table 31 shows that the manner in which the gross income of railway companies in the different popula-

tion groups is distributed varies considerably. The proportion of the gross income going to operating expenses is much less in the two groups of cities of more than 100,000 inhabitants than in the other groups. This is due to the economy of operation in large cities, as more fully shown later on. On the other hand, the deductions from income, including taxes, interest on bonds, rentals, and minor expenditures, constituted a greater proportion of the gross income of operating companies in the largest cities than elsewhere, a fact which is chiefly due to the great amount of rentals paid to lessor companies in such cities.

The amount paid for taxes and other public charges in urban centers of more than 500,000 inhabitants was 6.3 per cent of gross income of the operating companies in those centers, or 13.9 per cent of the gross income less operating expenses. The proportion going to taxes decreases in each of the successive urban groups, until in urban centers of less than 25,000 inhabitants it falls to only 2.8 per cent of gross income, taxes being, however, nearly 9 per cent of the income remaining after the deduction of operating expenses. Since street railways in small cities have a higher ratio of operating expenses to operating earnings than those in large cities, they can not properly be expected to pay as heavy taxes. An important reason for the increase in the ratio of taxes to net earnings with increasing population is that, as cities become larger, the functions of government expand, and the expenses of government grow, ordinarily, not only faster than population, but faster than taxable property, so that the tax rate tends to increase. In a considerable number of the larger cities, moreover, the street railway companies are required to make special payments in addition to the taxes paid alike by railways and by ordinary forms of property and other classes of corporations. Such

special payments are seldom required in smaller towns. The proportion of gross income going to taxes is even lower for long, fast interurban railways than for street railways in the smallest urban centers. This is presumably in part due to the fact that the rate of taxation in the rural communities through which these interurban lines run is generally lower than in urban communities. The higher proportion of taxes shown for other interurban railways would then be partly explicable by the greater extent to which their trackage lies within municipal limits. It is probable that the difference in the relative burden of taxation in the various classes of cities and on the two classes of interurban railways is attributable in some measure to differences in the efficiency and judgment of tax assessors. There can be little doubt, however, that the more profitable railways of the large cities can afford to pay as taxes a higher proportion of their gross earnings, and even of their net earnings, than the railways in small towns and rural districts.

The most striking point in regard to the deductions from income is the enormous amount of rentals paid by operating companies to lessor companies in urban centers of more than 500,000 inhabitants. Fully nine-tenths of the rental payments of all companies are made by the companies in the seven largest urban centers. There has been more occasion and cause for combination and consolidation in the large cities, where formerly many street railways were in operation, than in smaller places. Rentals constitute 18.8 per cent of the gross income of operating railways in the first group of urban centers, while in none of the other groups do they exceed 2.2 per cent.

The amount paid for interest on funded debt constitutes a smaller proportion of gross income, and likewise

a smaller proportion of gross income less operating expenses, among operating companies in urban centers of the first group than elsewhere. This is due to the fact that in such cities a large part of the debt of the railways is that of the lessor companies rather than that of the operating companies. The interest which lessor companies pay is received from the operating companies in the form of rentals. The proportion of interest to income is much greater for fast interurban railways than for those of any other group.

The operating railways in cities of the first group have, proportionately, less net income and dividends than in any other group except that of "other" interurban railways. Here again dividends of operating companies in large cities are reduced, because a large part of the stocks based on the railway property are those of lessor companies, and the dividends which the latter pay are deducted from the income of operating companies in the form of rentals. In the largest cities the net income of operating companies amounts to only 8.3 per cent of their gross income, while in cities of from 100,000 to 500,000 people the net income is 21.4 per cent of the gross income. In the first group dividends constitute only 4.3 per cent of gross income, while in urban centers of the next rank dividends are 12.4 per cent. The ratio of dividends to gross income and to gross income less operating expenses is least in urban centers of less than 25,000 inhabitants.

Condensed income account for full-time electric surface railway companies, without commercial lighting, classified according to population.—Table 32 shows a condensed income account of full-time surface railway companies having primarily electric traction and not furnishing commercial lighting, classified according to population of urban centers served.

TABLE 32.—CONDENSED INCOME ACCOUNT FOR FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.			INTERURBAN RAILWAYS.		
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	556	47	38	66	165	40	200
Gross income.....	\$206,261,288	\$104,912,972	\$45,613,791	\$15,399,948	\$6,385,919	\$7,640,642	\$26,308,016
Operating earnings.....	204,076,037	102,896,131	45,589,368	15,356,895	6,377,469	7,640,642	26,215,532
Operating expenses.....	118,236,568	58,089,586	24,684,272	9,366,539	4,388,638	4,579,621	17,127,912
Net earnings from operation.....	85,839,469	44,806,545	20,905,096	5,990,356	1,988,831	3,061,021	9,087,620
Income from other sources.....	2,185,251	2,016,841	24,423	43,053	8,450		92,484
Gross income, less operating expenses.....	88,024,720	46,823,386	20,929,519	6,033,409	1,997,281	3,061,021	9,180,104
Deductions from income, total.....	65,775,778	40,670,995	11,314,425	3,187,746	1,221,224	2,374,732	7,006,656
Taxes.....	10,831,931	6,335,643	2,399,990	578,866	183,729	189,522	1,144,181
Interest, total.....	29,084,550	11,134,669	7,690,277	2,140,530	993,147	2,092,421	5,033,506
On funded debt.....	26,669,877	10,267,696	7,282,840	1,951,323	862,827	1,959,117	4,346,074
On other debt.....	2,414,673	866,973	407,437	189,207	130,320	133,304	687,432
Rental of leased lines.....	25,371,536	28,135,166	1,152,209	365,240	25,000	51,347	642,574
Miscellaneous deductions.....	487,761	65,517	71,949	103,110	19,348	41,442	186,395
Net income.....	22,248,942	6,152,391	9,615,094	2,845,663	776,057	686,289	2,178,448
Dividends.....	12,193,247	2,610,240	5,933,901	1,194,250	199,280	201,124	2,054,452
Surplus.....	10,055,695	3,542,151	3,681,193	1,651,413	576,777	485,165	118,996

¹ Exclusive of reports for 16 companies which failed to furnish this information.

The percentages which the various items of disbursements bear to the gross income are shown in the following table for the same class of railways as in Table 32. These statistics present a few rather important differences as regards three of the urban groups from those for all companies combined in the preceding tables.

TABLE 33.—Percentage distribution of gross income of full-time electric surface railway companies, without commercial lighting, classified according to population: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Gross income	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating expenses	57.3	55.4	54.1	60.8	68.7	60.0	65.1
Taxes	5.3	6.0	5.3	3.8	2.9	2.5	4.4
Interest, total	14.1	10.6	16.9	13.9	15.6	27.4	19.1
On funded debt	12.9	9.8	16.0	12.7	13.5	25.6	16.5
On other debt	1.2	0.8	0.9	1.2	2.1	1.8	2.6
Rentals of leased lines	12.3	22.0	2.5	2.4	0.4	0.7	2.4
Miscellaneous deductions	0.2	0.1	0.1	0.7	0.3	0.5	0.7
Dividends	5.9	2.5	13.0	7.7	3.1	2.6	7.8
Surplus	4.9	3.4	8.1	10.7	9.0	6.3	0.5

It will be noticed that these full-time electric surface railways in centers of 500,000 and over show somewhat smaller proportionate payments for taxes, in-

terest, and dividends than do street railways as a whole, and that on the other hand they show a very much larger proportionate payment for rentals. (Compare Tables 31 and 33.) These differences are largely due to the fact that the elevated railways, which are all within the largest urban centers and which are excluded from the tables now under consideration, make relatively large payments for taxes, interest, and dividends, but do not operate any lines under lease, and hence reported no rentals. The electric railways having commercial lighting plants are, for the most part, in the two classes of urban centers of less than 100,000 inhabitants. Companies with lighting plants show a larger proportion of interest and a smaller proportion of dividends than companies without lighting plants. This is one explanation of the fact that in the last two urban groups the electric railway companies not furnishing commercial lighting show a smaller proportion of interest and a larger proportion of dividends than appear when all classes of companies are taken together.

Combined income account for operating and lessor companies, classified according to population.—Table 34 shows the income account for all operating and lessor companies combined, classified according to the population groups, while Table 35 shows the percentages of the various items of disbursement.

TABLE 34.—CONDENSED INCOME ACCOUNT FOR OPERATING AND LESSOR COMPANIES COMBINED, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.			INTERURBAN RAILWAYS.		
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies	957	138	56	99	314	60	290
Gross income	\$250,526,642	\$123,310,971	\$51,064,217	\$22,828,007	\$12,005,511	\$10,165,768	\$31,152,168
Operating earnings	247,553,999	120,837,007	51,008,983	22,728,795	11,879,327	10,161,736	30,938,151
Operating expenses	142,312,697	67,300,048	27,308,769	13,480,577	8,088,172	6,076,983	20,068,048
Net earnings from operation	105,241,402	53,536,959	23,700,214	9,248,218	3,791,155	4,084,753	10,880,103
Income from other sources	2,972,643	2,473,964	55,284	99,212	126,184	4,032	214,017
Gross income less operating expenses	108,214,045	56,010,923	23,755,448	9,347,430	3,917,339	4,088,785	11,094,120
Deductions from income, total	60,849,231	30,682,945	11,756,925	4,803,329	2,328,849	3,119,555	8,158,627
Taxes	13,366,335	8,021,181	2,611,881	824,099	340,228	243,539	1,325,407
Interest, total	46,462,470	22,465,107	8,798,353	3,868,726	1,953,948	2,767,248	6,609,068
On funded debt	43,578,961	21,460,962	8,366,503	3,508,997	1,732,822	2,598,438	5,821,239
On other debt	2,883,509	1,004,145	431,850	269,729	221,126	168,810	787,849
Miscellaneous deductions	1,020,426	196,657	345,692	110,504	34,673	108,768	224,132
Net income	47,364,814	25,327,978	11,999,522	4,544,101	1,588,490	969,230	2,935,493
Dividends	33,039,171	20,958,959	7,344,007	1,650,123	811,575	315,224	2,459,293
Surplus	14,325,643	4,369,019	4,655,515	2,893,978	1,276,915	654,006	476,210

¹ Exclusive of reports for 30 companies which failed to furnish this information.

STREET AND ELECTRIC RAILWAYS.

TABLE 35.—Percentage distribution of gross income for operating and lessor companies combined, classified according to population: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Gross income	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating expenses.....	56.8	54.6	53.5	59.1	67.4	59.8	64.4
Taxes.....	5.3	6.5	5.1	3.6	2.8	2.4	4.3
Interest, total.....	18.6	18.2	17.2	16.9	16.3	27.2	21.2
On funded debt.....	17.4	17.4	16.4	15.7	14.4	25.6	18.7
On other debt.....	1.2	0.8	0.8	1.2	1.9	1.6	2.5
Miscellaneous deductions.....	0.4	0.2	0.7	0.5	0.3	1.1	0.7
Dividends.....	13.2	17.0	14.4	7.2	2.6	3.1	7.9
Surplus.....	5.7	3.5	9.1	12.7	10.6	6.4	1.5

The chief differences between this combined income account and the income account of operating companies alone lie in the items of rentals, interest, and dividends. Since lessor companies are found mostly in urban centers of the largest size, the combined income account for such centers differs materially from the income account of operating companies alone, while in the other groups little difference appears.

In urban centers of more than 500,000 inhabitants the combined "deductions from income" or fixed charges—taxes, interest, and miscellaneous deductions—for all railway companies considered as a single system are equal to 24.9 per cent of the gross income. This proportion is slightly larger than for any other urban group, but is smaller than for the two interurban groups. In the largest cities the proportion of dividends to the gross income is 17 per cent, exceeding somewhat the proportion in urban centers of the next size, and greatly exceeding the proportion in any of the other groups. All the other groups except the "other" interurban railways, however, carried a larger propor-

tion of their gross income to surplus than the companies in the largest cities. Interest and dividends combined constitute 35.2 per cent of the gross income in the first group, as compared with 31.6 per cent in the second group, 24.1 per cent in the third group, and only 18.9 per cent in urban centers of less than 25,000 inhabitants.

Condensed income accounts, by states.—Table 36 shows by states the gross income of all operating companies, consisting of the operating earnings plus the income from other sources, and Table 37 presents a condensed income account for all operating street and interurban railway companies by states.

The various items of taxes and fixed charges are shown in detail for each state in Table 38.

TABLE 36.—Gross income of operating companies, by states and territories: 1902.¹

STATE OR TERRITORY.	Number of companies.	Amount.	STATE OR TERRITORY.	Number of companies.	Amount.
United States.....	799	\$250,504,627	Missouri.....	16	\$10,734,692
Alabama.....	9	1,497,351	Montana.....	5	492,023
Arkansas.....	7	371,560	Nebraska.....	4	1,148,994
California.....	35	9,967,838	New Hampshire.....	7	604,181
Colorado.....	7	2,227,766	New Jersey.....	25	8,176,923
Connecticut.....	21	4,355,775	New York.....	96	60,881,780
Delaware.....	3	500,559	North Carolina.....	7	442,467
Florida.....	6	529,743	Ohio.....	62	16,599,851
Georgia.....	10	2,375,224	Oregon.....	6	1,042,896
Illinois.....	48	25,029,257	Pennsylvania.....	98	30,357,727
Indiana.....	26	3,813,076	Rhode Island.....	7	2,964,260
Iowa.....	22	2,403,834	South Carolina.....	7	653,736
Kansas.....	11	370,481	Tennessee.....	8	1,466,835
Kentucky.....	12	2,933,800	Texas.....	17	1,547,846
Louisiana.....	8	2,910,244	Utah.....	3	586,611
Maine.....	19	1,571,662	Vermont.....	9	249,228
Maryland.....	10	4,898,627	Virginia.....	16	1,667,022
Massachusetts.....	74	23,633,410	Washington.....	8	2,542,906
Michigan.....	24	6,521,173	West Virginia.....	8	1,102,171
Minnesota.....	5	3,727,648	Wisconsin.....	17	3,923,884
Mississippi.....	5	258,654	All other states and territories ²	11	3,021,063

¹ Exclusive of reports for 18 companies which failed to furnish this information.

² Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico 1.

FINANCIAL OPERATIONS.

63

TABLE 37.—CONDENSED INCOME ACCOUNT FOR OPERATING COMPANIES, BY STATES AND TERRITORIES: 1902.¹

STATE OR TERRITORY.	Number of companies.	Gross earnings from operation.	OPERATING EXPENSES.		Net earnings from operation.	Income from other sources.	Gross income less operating expenses.	Deductions from income (taxes and fixed charges).	Net income of companies reporting net income.	Deficit of companies reporting deficit.	Net income for state.	Dividends.	Surplus.
			Amount.	Percentage of earnings.									
United States.....	799	\$247,558,999	\$142,312,597	57.5	\$105,241,402	\$2,950,628	\$108,192,030	\$77,595,053	\$34,352,684	\$3,755,707	\$30,596,977	\$15,882,110	\$14,714,867
Alabama.....	9	1,497,351	878,291	58.7	619,060		619,060	384,762	244,243	9,945	234,298	81,000	153,298
Arkansas.....	7	371,560	216,483	58.2	155,127		155,127	68,071	87,683	577	87,056		87,056
California.....	35	9,967,288	5,402,245	54.2	4,565,043	550	4,565,593	2,112,959	2,461,414	8,780	2,452,634	653,412	1,799,222
Colorado.....	7	2,227,286	1,300,606	58.4	926,680	480	927,160	536,005	432,428	41,273	391,155	180,000	211,155
Connecticut.....	21	4,284,039	2,773,608	64.7	1,510,431	71,686	1,582,167	1,128,319	461,604	7,756	453,848	231,062	222,786
Delaware.....	3	500,412	360,590	72.1	139,822	147	139,969	77,439	79,591	17,061	62,530	9,331	53,199
Florida.....	6	529,743	339,375	64.1	190,368		190,368	74,779	116,337	798	115,589	40,720	74,869
Georgia.....	10	2,375,224	1,232,320	51.9	1,142,904		1,142,904	755,207	387,697		387,697	33,952	353,745
Illinois.....	48	24,164,965	14,103,211	58.4	10,061,754	864,292	10,926,046	8,453,191	3,196,378	723,523	2,472,855	2,310,710	162,145
Indiana.....	26	3,813,076	2,219,791	58.2	1,593,285		1,593,285	1,201,297	438,115	46,127	391,988	33,974	358,014
Iowa.....	22	2,384,421	1,460,993	61.3	923,428	19,418	942,841	429,373	529,085	15,617	513,468	117,660	396,808
Kansas.....	11	370,481	257,248	69.4	113,233		113,233	64,451	48,839	57	48,782	4,000	44,782
Kentucky.....	12	2,932,901	1,560,270	53.2	1,372,631	899	1,373,530	777,433	602,551	6,454	596,097	371,000	225,097
Louisiana.....	8	2,910,244	1,758,989	60.4	1,151,255		1,151,255	690,380	463,813	2,438	460,875	362,198	98,677
Maine.....	19	1,542,508	1,127,660	73.1	414,848	29,054	443,902	337,050	148,961	42,109	106,852	67,829	39,023
Maryland.....	10	4,898,627	2,312,323	47.2	2,586,304		2,586,304	2,555,715	55,690	25,101	30,589	4,000	26,589
Massachusetts.....	74	23,617,570	16,403,667	69.5	7,213,903	15,840	7,229,743	5,108,619	2,301,508	180,384	2,121,124	1,910,060	211,064
Michigan.....	24	6,494,691	3,655,328	56.3	2,839,363	26,482	2,865,845	1,788,797	1,145,719	68,671	1,077,048	612,000	465,048
Minnesota.....	5	3,727,648	1,719,687	46.1	2,007,961		2,007,961	1,027,121	980,840		980,840	870,400	110,440
Mississippi.....	5	258,654	192,056	74.3	66,598		66,598	38,684	28,764	850	27,914		27,914
Missouri.....	16	10,691,220	6,071,971	56.8	4,619,249	43,472	4,662,721	4,635,401	459,982	432,662	27,320	313,337	*286,017
Montana.....	5	492,023	365,073	74.2	126,950		126,950	74,633	66,196	13,879	52,317		52,317
Nebraska.....	4	1,148,994	655,729	57.1	493,265		493,265	150,297	343,949	981	342,968	230,800	112,168
New Hampshire.....	7	604,131	478,849	79.3	125,282		125,282	83,786	45,225	3,729	41,496	8,250	33,246
New Jersey.....	25	8,137,477	4,324,112	53.1	3,813,365	39,446	3,852,811	3,625,740	385,232	158,161	227,071	78,420	148,651
New York.....	96	59,315,606	33,677,724	56.8	25,637,882	1,566,174	27,204,056	19,552,955	8,391,716	740,615	7,651,101	3,133,655	4,517,446
North Carolina.....	7	437,259	322,344	73.7	114,915	5,208	120,123	98,993	47,071	25,941	21,130		21,130
Ohio.....	62	16,587,693	9,132,480	55.1	7,455,213	12,158	7,467,371	4,137,566	3,467,102	137,597	3,329,505	1,644,598	1,684,907
Oregon.....	6	1,042,895	653,912	62.7	388,983		388,983	146,519	243,721	1,257	242,464	54,048	188,416
Pennsylvania.....	98	30,319,211	15,624,813	51.5	14,694,398	38,516	14,732,914	12,868,286	2,497,069	632,441	1,864,628	621,811	1,242,817
Rhode Island.....	7	2,964,260	1,892,477	63.8	1,071,783		1,071,783	351,767	912,477	192,461	720,016	760,000	*39,984
South Carolina.....	7	597,577	398,662	66.7	198,915	56,159	255,074	203,196	60,318	8,440	51,878	720	51,158
Tennessee.....	8	1,866,835	1,079,237	57.8	787,598		787,598	595,356	222,214	29,972	192,242		192,242
Texas.....	17	1,547,846	993,600	64.2	554,246		554,246	199,483	360,335	5,572	354,763	22,600	332,163
Utah.....	3	561,328	356,879	63.6	204,449	25,283	229,732	172,424	57,308		57,308	3,000	54,308
Vermont.....	9	249,228	201,179	80.7	48,049		48,049	45,089	20,704	17,744	2,960	8,750	*5,790
Virginia.....	16	1,553,478	1,009,356	65.0	544,122	113,544	657,666	547,730	151,899	41,963	109,936	33,395	76,541
Washington.....	8	2,542,906	1,576,018	62.0	966,888		966,888	463,101	504,784	997	503,787	150,028	353,759
West Virginia.....	8	1,102,171	652,862	59.2	449,309		449,309	265,842	183,467		183,467	22,000	161,467
Wisconsin.....	17	3,902,059	1,995,024	51.1	1,907,035	21,825	1,928,860	1,081,160	847,700		847,700	300,563	547,137
All other states and territories ²	11	3,021,063	1,575,605	52.2	1,445,458		1,445,458	685,777	873,455	113,774	759,681	602,827	156,854
Hawaii and Porto Rico.....	5	515,913	330,350	64.0	185,563		185,563	106,015	99,943	20,395	79,548	19,500	60,048

¹ Exclusive of reports for 18 companies which failed to furnish this information.² Deficit.³ Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

STREET AND ELECTRIC RAILWAYS.

TABLE 38.—ANALYSIS OF DEDUCTIONS FROM INCOME (TAXES AND FIXED CHARGES) OF OPERATING COMPANIES, BY STATES AND TERRITORIES: 1902.¹

STATE OR TERRITORY.	Number of companies.	Aggregate.	TAXES.					INTEREST.				Rent of leased lines and terminals.	Miscellaneous.
			Total.	Real and personal property.	Capital stock.	Earnings.	Miscellaneous.	Total.	Funded debt.	Real estate mortgages.	Floating debt.		
United States..	799	\$77,595,053	\$13,078,899	\$5,835,542	\$2,931,252	\$2,719,287	\$1,592,818	\$38,085,911	\$35,223,284	\$93,078	\$2,769,549	\$25,518,225	\$912,018
Alabama.....	9	884,762	37,047	32,940		669	3,438	347,330	254,653		92,677		385
Arkansas.....	7	68,071	7,213	6,229		895	89	60,858	50,850		10,008		
California.....	35	2,112,959	495,179	471,136		21,448	2,596	1,617,550	1,579,043		38,507		230
Colorado.....	7	536,005	78,264	78,264				454,479	441,645		12,834	3,262	
Connecticut.....	21	1,128,319	243,393	4,352	227,562	11,479		757,580	732,108		25,472	106,046	19,300
Delaware.....	8	77,439	13,973	11,976			1,997	63,466	39,000	2,250	22,216		
Florida.....	6	74,779	12,439	11,714			725	62,340	62,220		120		
Georgia.....	10	755,207	110,846	108,579			2,267	644,361	642,712		1,649		
Illinois.....	48	8,453,191	1,488,359	740,969	558,794		188,576	3,037,830	2,786,563	11,530	239,737	3,875,007	51,995
Indiana.....	26	1,201,297	185,014	151,609			33,405	984,391	952,219		32,172		31,892
Iowa.....	22	429,373	54,115	41,390	12,000		725	353,118	344,839		8,279		22,140
Kansas.....	11	64,451	8,401	7,320			1,075	56,050	55,500		550		
Kentucky.....	12	777,433	177,775	52,843	124,174		758	598,594	591,672		6,922		1,064
Louisiana.....	8	690,380	200,156	179,549		20,607		483,594	476,530	400	6,664		6,630
Maine.....	19	337,050	29,704	16,748	50	12,522	384	301,772	266,969	667	34,136	4,000	1,574
Maryland.....	10	2,555,715	402,223	82,605	196	308,117	11,305	2,151,517	2,138,492		13,025	1,975	
Massachusetts.....	74	5,108,619	1,609,496	437,893	854,402	317,055	146	1,524,248	1,071,242	712	452,294	1,967,540	7,335
Michigan.....	24	1,748,797	228,538	194,559		30,823	3,156	1,547,772	1,501,111		46,661		12,487
Minnesota.....	5	1,027,121	131,128	128,518		2,610		870,038	864,422		5,616	24,064	1,891
Mississippi.....	5	38,684	4,501	4,176			325	34,183	32,175		2,006		
Missouri.....	18	4,635,401	646,682	528,127		22,528	101,027	1,756,840	1,439,798	1,677	315,365	2,230,164	1,715
Montana.....	5	74,633	13,975	11,075	200	1,532	1,168	60,658	58,375		2,283		
Nebraska.....	4	150,297	28,252	28,252				122,045	119,750		2,295		
New Hampshire.....	7	83,786	7,822	6,151	1,671			47,390	39,550		7,840	28,574	
New Jersey.....	25	3,625,740	431,912	221,200	1,616	159,561	49,535	1,573,411	1,476,383	10,114	86,914	1,586,217	34,200
New York.....	96	19,552,955	3,428,461	1,450,203	251,726	975,753	750,779	10,333,127	9,528,743	30,746	773,638	5,719,589	71,778
North Carolina.....	7	98,993	10,791	10,791				87,219	80,310		6,909		983
Ohio.....	62	4,137,866	601,142	313,845	1,569	233,441	52,287	2,457,594	2,295,268	3,280	159,036	1,066,636	12,504
Oregon.....	6	146,519	17,622	13,636			3,986	128,897	128,719		178		
Pennsylvania.....	98	12,868,286	1,576,476	102,673	896,619	250,620	326,564	2,056,166	1,870,540	18,804	166,822	8,902,431	333,213
Rhode Island.....	7	351,767	140,814	36,777		103,993	44	210,953	205,360		5,598		
South Carolina.....	7	203,196	21,109	21,109				180,392	161,259		19,133	720	975
Tennessee.....	8	595,356	113,573	107,377			6,196	478,473	441,222		37,251		3,310
Texas.....	17	199,483	36,919	36,525			394	162,564	152,912		9,652		
Utah.....	3	172,424	16,702	16,552			150	155,613	140,000		15,613		109
Vermont.....	9	45,069	4,427	644	673	3,075	35	40,662	36,721		3,941		
Virginia.....	16	547,730	46,845	28,989		808	17,048	490,484	467,662	3,600	19,222		10,401
Washington.....	8	463,101	78,239	61,987		16,252		384,862	374,163		10,699		
West Virginia.....	8	265,842	28,030	27,483		547		237,812	230,959		6,853		
Wisconsin.....	17	1,081,160	150,059	3,952		146,107		646,194	624,205	6,634	15,355		284,907
All other states and territories ²	11	685,777	161,283	49,799		78,845	32,639	523,494	467,420	2,664	53,410		1,000
Hawaii and Porto Rico.....	5	106,015	10,987	10,305	158	350	174	68,618	66,305		2,313		26,410

¹ Exclusive of reports for 18 companies which failed to furnish this information.² Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

The income account of nonoperating lessor companies, account for operating and lessor companies considered by states is shown in Table 39, and the combined income as one system, by states, in Table 40.

TABLE 39.—INCOME ACCOUNT FOR NONOPERATING LESSOR COMPANIES, BY STATES: 1902.¹

STATE.	Number of companies.	INCOME.					EXPENDITURES.					Net income of companies reporting net income.	Deficit of companies reporting deficit.	Net income for state.	Dividends.	Surplus.
		Total.	Rental.	Miscellaneous.	Aggregate.	Taxes.	Interest.			Maintenance of organization, and miscellaneous.						
							Total.	On funded debt.	On floating debt and real estate mortgages.							
United States.	158	\$26,138,899	\$26,116,884	\$22,015	\$8,779,294	\$287,436	\$8,376,559	\$8,355,677	\$20,882	\$115,299	\$17,359,837	\$232	\$17,359,605	\$17,157,061	\$202,544	
Connecticut.....	4	113,546	113,546		77,363	18,052	43,704	36,500	7,204	15,607	36,183		36,183	44,000	*7,817	
Illinois.....	8	3,758,762	3,758,762		1,323,507		1,323,507	1,323,507			2,435,255		2,435,255	2,435,255		
Massachusetts.....	18	1,986,774	1,986,774		705,967	845	695,678	682,427	13,251	9,444	1,280,989	182	1,280,807	1,272,395	8,412	
New Hampshire.....	6	80,875	80,875		37,125		37,125	37,125			43,750		43,750		43,750	
New Jersey.....	4	1,586,217	1,586,217		1,165,747		1,160,560	1,160,560		5,187	420,470		420,470	369,220	51,250	
New York.....	23	5,703,608	5,697,399	6,209	1,937,801		1,908,060	1,908,060		29,741	3,765,807		3,765,807	3,747,209	18,598	
Ohio.....	4	1,059,814	1,059,814		55,425		55,425	55,425			1,004,389		1,004,389	988,956	15,433	
Pennsylvania.....	86	9,608,918	9,593,112	15,806	1,821,203	268,404	1,497,969	1,497,542	427	54,830	7,787,765	50	7,787,715	7,529,069	258,646	
All other states ²	5	2,240,385	2,240,385		1,635,156	135	1,654,531	1,654,531		490	585,229		585,229	770,957	*185,728	

¹ Exclusive of reports for 12 companies which failed to furnish this information.

² Deficit.

³ Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Colorado, 1; Maine, 1; Maryland, 2; Missouri, 1.

TABLE 40.—CONDENSED INCOME ACCOUNT FOR OPERATING AND LESSOR COMPANIES COMBINED, BY STATES: 1902.¹

STATE.	Number of companies.	Operating earnings.	Operating expenses.	Net earnings from operation.	Income from all other sources.	Gross income less operating expenses.	DEDUCTIONS FROM INCOME (TAXES AND FIXED CHARGES).						Net income.	Dividends.	Surplus.
							Aggregate.	Taxes.	Interest.			Miscellaneous.			
									Total.	On funded debt.	On other debt.				
Connecticut.....	25	\$4,284,089	\$2,773,608	\$1,510,481	\$71,686	\$1,582,167	\$1,097,636	\$261,445	\$801,284	\$768,608	\$32,676	\$34,907	\$484,531	\$275,062	\$209,469
Illinois.....	56	24,164,965	14,103,211	10,061,754	864,292	10,926,046	5,901,691	1,488,359	4,361,337	4,110,070	251,267	51,995	5,024,355	4,745,965	278,390
Massachusetts.....	92	23,617,570	16,403,667	7,213,903	15,840	7,229,743	3,847,046	1,610,341	2,219,926	1,753,669	466,257	16,779	3,382,697	3,182,455	200,242
New Hampshire.....	13	604,131	478,849	125,282		125,282	92,337	7,822	84,515	76,675	7,840		32,945	8,250	24,695
New Jersey.....	29	8,137,477	4,324,112	3,813,365	39,446	3,852,811	3,205,270	431,912	2,733,971	2,636,943	97,028	39,387	647,541	447,640	199,901
New York.....	119	59,315,606	38,677,724	25,637,882	1,572,383	27,210,265	15,771,167	3,428,461	12,241,187	11,436,803	804,384	101,519	11,439,096	6,880,864	4,558,234
Ohio.....	66	16,587,693	9,132,480	7,455,213	12,156	7,467,371	3,126,655	601,142	2,613,009	2,350,693	162,316	12,504	4,340,716	2,633,564	1,707,162
Pennsylvania.....	184	30,319,211	15,624,813	14,694,398	54,322	14,748,720	5,787,108	1,844,880	3,554,135	3,368,082	186,053	388,093	8,961,612	8,150,880	810,732
All other states ²	57	19,359,641	10,812,560	8,547,081	73,006	8,620,087	7,479,926	1,157,008	6,319,139	5,941,435	377,704	3,779	1,140,161	1,336,123	*196,962

¹ Exclusive of reports for 12 lessor companies which failed to furnish this information.

² Includes states having less than 3 lessor companies, in order that the operations of individual companies may not be disclosed. The companies are distributed as follows: Colorado, 1; Maine, 1; Maryland, 2; Missouri, 1.

³ Deficit.

Wide differences appear among the states in the proportions which the various items of the income account bear to one another.

From Table 37 it will be seen that the operating earnings of the companies in the state of New York—\$59,315,606—constitute no less than 24 per cent of the total for the United States, which amounts to \$247,553,999. The operating earnings of the companies in Pennsylvania are somewhat more than one-half as great as those of the New York companies. Illinois is third, with about one-tenth of the street railway earnings of the country, while Massachusetts, which shows a remarkable development of interurban traffic, follows close after Illinois. Of the total net earnings from operation—\$105,241,402—New York companies show \$25,637,882, or 24.4 per cent. The fact that the street railway companies of New York and Illinois together

have more than five-sixths of the "income from other sources" than operation is explained by the large extent to which companies in Chicago and New York city hold the securities of other companies.

Taxes in the several states.—The statistics for states showing the proportion which the contributions of street railway companies to the public treasury bear to their gross income and to their income less operating expenses throw some, though on the whole but little, light upon the policy prevailing under state laws and local ordinances concerning the taxation of this business and the requirement of compensation for special privileges. Quite as important a cause of the wide variations that appear among the states in this respect is found in the differences in the expense of government and in the general rate and methods of taxation in the communities where the railways are located. The pro-

portion of taxes to gross income, and even to gross income less operating expenses, is in general lowest in those states where the greatest proportion of railways are in small towns; notably in various states of the West and South, which are lacking in large urban communities. In a number of these states the taxes paid were less than 2.5 per cent of the gross income of the companies.

Table 41 shows the ratio of taxes to gross income, and to income less operating expenses, in the more important states. It will be seen that Michigan, Ohio, and Indiana are the only states in the table in which the taxes were less than 5 per cent of the gross income. The lower ratio of taxes in these states is probably due in part to the large proportion of interurban railways, the taxation upon which is as yet less heavy than that upon street railways in cities.

TABLE 41.—Percentage of taxes to income, for street and interurban railways, in selected states: 1902.

STATE.	PERCENTAGE OF TAXES TO—	
	Gross income.	Gross income less operating expenses.
California.....	5.0	10.8
Connecticut.....	6.0	16.5
Illinois.....	5.9	13.6
Indiana.....	4.9	11.6
Kentucky.....	6.1	12.9
Louisiana.....	6.9	17.4
Maryland.....	8.2	15.6
Massachusetts.....	6.8	22.3
Michigan.....	3.5	8.0
Missouri.....	6.0	13.9
New Jersey.....	5.3	11.2
New York.....	5.6	12.6
Ohio.....	3.6	8.1
Pennsylvania.....	6.1	12.5
Tennessee.....	6.1	14.4

Payments to public authorities are heavier in Maryland than in any other state, being 8.2 per cent of gross income and 15.6 per cent of gross income less operating expenses. This fact is due to the policy of the city of Baltimore in requiring a large franchise payment annually from her railways. Louisiana and Massachusetts come next with taxes amounting to nearly 7 per cent of gross income. The high proportion in Massachusetts is not attributable to the requirement of special franchise payments to local governments, but rather to the methods of assessing corporate property in general in that commonwealth, and to the commutation of the ordinary requirements regarding maintenance and care of the street surface into cash payments to the local authorities.

In Chapter IX will be found a digest of information regarding the special payments for franchise privileges required from street railways in various cities and towns.

Rentals of leased lines, by states.—The widest difference appears among the states as regards the amount of rental paid for leased lines. In only 12 states are

there any lessor companies. The rentals paid in 3 states alone, Pennsylvania, Illinois, and New York, amount to about three-fourths of the total rentals for the United States. The rentals paid by operating companies in Pennsylvania amount to no less than \$8,902,431, or 29 per cent of the gross income of the companies. The rentals paid in Pennsylvania are equal to nearly three times the amount paid by all the operating companies of that state as interest and dividends on their own securities. In Philadelphia almost all the railway trackage has come under the control of a single operating company, which itself owns no track, but which holds and operates the system under a complicated series of leases and subleases. Five-sixths of the entire net operating earnings of this company go to pay the rentals on the bonds and stocks of its 38 lessor companies. A similar condition of affairs exists in Pittsburgh. A large proportion of the surface railway trackage of New York city is likewise controlled under lease, and the rentals paid by operating companies in the state as a whole are equal to nearly one-tenth of their gross income. In Illinois rentals are equal to 15 per cent of the gross income of the railway companies. The Union Traction Company of Chicago, the most important company in that city, holds its trackage altogether under lease. The most important railway system of St. Louis is likewise leased by one company to another, and the rental of leased lines in Missouri is equal to more than one-fifth of the gross income of the street railway companies of the state.

Detailed comment on the figures of interest, net income, dividends, and surplus in the several states would be superfluous. Attention may, however, be called again to the fact that profits in the street railway business do not by any means necessarily depend upon a high proportionate net income. Thus the street railway business in a state in which the proportion of net income is relatively small may yet be highly profitable business, even as disclosed in the income account. Payments to capital in the form of interest and rentals, which are deducted when computing net income, are quite as real a return as those which take the form of dividends. The combined income account for operating and lessor companies, Table 40, gives a very different view of the profitability of street railway operation in some of the states from that which appears in the income account of operating railways alone.

II.

ANALYSIS OF OPERATING EARNINGS.

Operating earnings of companies, classified according to power.—Table 42 shows, for all companies and for the various groups distinguished according to the character of power used, the amount of operating earnings from the different sources.

FINANCIAL OPERATIONS.

67

TABLE 42.—OPERATING EARNINGS OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric elevated.	Cable, surface, and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.				
Number of companies.....	799	556	112	57	52	5	14	3
Operating earnings.....	\$247,553,999	\$204,076,037	\$22,088,656	\$2,475,365	\$1,475,901	\$16,397,867	\$1,024,323	\$15,850
From passengers.....	233,821,548	197,989,040	15,084,584	2,344,571	1,449,228	16,001,186	945,160	7,779
From chartered cars.....	308,608	261,588	38,949	3,005	66			
From freight.....	1,038,097	780,444	182,076	21,788	10,242		35,854	7,693
From mail.....	432,060	390,256	20,623	2,081	1,005	17,948	17	150
From express.....	401,672	377,439	17,560	5,419	280		824	150
From sale of electric current for light and power.....	7,703,574	1,196,025	6,445,542	62,007				
From miscellaneous sources.....	3,853,420	3,081,245	299,322	36,494	15,080	378,733	42,468	78

¹ Exclusive of reports for 18 companies which failed to furnish this information.

Table 43 shows the percentage which each item bears to the total earnings of the group.

TABLE 43.—PERCENTAGE DISTRIBUTION, BY SOURCES, OF OPERATING EARNINGS OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric elevated.	Cable, surface, and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.				
Operating earnings.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
From passengers.....	94.4	97.0	68.3	94.7	96.2	97.6	92.3	49.1
From chartered cars.....	0.1	0.1	0.2	0.1	(¹)			
From freight.....	0.4	0.4	0.8	0.9	0.7		3.5	48.6
From mail.....	0.2	0.2	0.1	0.1	0.1	0.1	(¹)	0.9
From express.....	0.2	0.2	0.1	0.2	(¹)		0.1	0.9
From sale of electric current for light and power.....	3.1	0.6	29.2	2.5				
From miscellaneous sources.....	1.6	1.5	1.3	1.5	1.0	2.3	4.1	0.5

¹ Less than one-tenth of 1 per cent.

It will be seen that including the small amount from chartered cars 94.5 per cent of the earnings of all companies were derived from passenger traffic. Of the other sources of earnings the sale of electric current for light and power was the most important. Of the receipts from this last source 83.7 per cent were earned by that group of electric railways which operate fairly distinct and important light and power plants in addition to their railway business. They derived 29.2 per cent of their operating earnings from the sale of light and power. It is scarcely possible to draw a sharp distinction between companies which operate commercial lighting plants and those which do not. The small sales of current reported by companies which are not regarded by the Bureau of the Census as operating separate light and power plants are, in considerable measure, made to other railway companies or to electric light companies, which take the current directly at the dynamo and distribute it.

Railway companies differ to some extent in regard to the distinction which they make between freight and express business, and the amounts of these items, therefore, can not be considered as based upon exact definitions. Elevated railways reported only a small amount of income from mail service and none from freight and express. The freight earnings of the group of cable railways are confined to the inclined plane roads, which derive about one-sixth of their revenue from this source.

The item of miscellaneous earnings covers receipts from a considerable variety of sources. In the case of some companies it includes a certain amount of revenue which, strictly speaking, should be treated as miscellaneous income rather than as earnings, since it is derived from sources not directly connected with the railway or with the accompanying light and power business, but which was not distinguished in the returns from earnings proper. The most important source of miscellaneous earnings was street car advertising, and, particularly in the case of elevated railways, advertising in stations. This revenue belongs properly enough to earnings. Some companies derive a small amount of earnings from parks and other pleasure resorts which they operate. In the majority of instances, however, these establishments are run at a loss, so far as their direct operations are concerned, the company making its profit from the increase in traffic. The sums received by certain railway companies for permitting the cars of other companies to run over their tracks are likewise properly included under the head of miscellaneous earnings.

Operating earnings of companies, classified according to population.—Tables 44 and 45 show the amount and percentage distribution of the various items of operating earnings of all street and interurban railway companies, classified according to the population of the urban centers served, with the further distinction of the two classes of interurban railways.

STREET AND ELECTRIC RAILWAYS.

TABLE 44.—OPERATING EARNINGS, BY SOURCES, OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	799	65	47	88	312	53	289
Operating earnings.....	\$247,553,999	\$120,837,007	\$51,008,988	\$22,728,795	\$11,879,327	\$10,161,736	\$30,938,151
From passengers.....	233,821,548	118,195,786	49,014,651	19,928,711	9,241,431	8,994,849	28,446,120
From chartered cars.....	303,606	70,966	65,305	23,656	12,239	37,967	93,435
From freight.....	1,038,097	34,386	141,574	158,499	81,323	300,685	321,690
From mail.....	432,080	217,777	76,081	28,251	18,335	29,126	67,510
From express.....	401,672	53,193	7,191	4,946	13,023	171,111	153,208
From sale of electric current for light and power.....	7,703,574	425,925	1,011,031	2,236,787	2,256,694	397,217	1,372,920
From miscellaneous sources.....	3,853,420	1,839,004	693,150	352,945	254,282	230,761	483,278

¹ Exclusive of reports for 18 companies which failed to furnish this information.

TABLE 45.—PERCENTAGE DISTRIBUTION, BY SOURCES, OF OPERATING EARNINGS OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Operating earnings.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
From passengers.....	94.4	97.8	96.1	87.7	77.8	88.5	92.0
From chartered cars.....	0.1	0.1	0.1	0.1	0.1	0.4	0.3
From freight.....	0.4	(¹)	0.3	0.7	0.7	2.9	1.0
From mail.....	0.2	0.2	0.1	0.1	0.2	0.3	0.2
From express.....	0.2	(¹)	(¹)	(¹)	0.1	1.7	0.5
From sale of electric current for light and power.....	3.1	0.4	2.0	9.8	19.0	3.9	4.4
From miscellaneous sources.....	1.6	1.5	1.4	1.6	2.1	2.3	1.6

¹ Less than one-tenth of 1 per cent.

The corresponding statistics for full-time electric surface railways not furnishing commercial lighting are presented in Tables 46 and 47.

TABLE 46.—OPERATING EARNINGS, BY SOURCES, OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	556	47	38	66	165	40	200
Operating earnings.....	\$204,076,037	\$102,896,131	\$45,589,868	\$15,356,895	\$6,377,469	\$7,640,612	\$26,215,532
From passengers.....	197,989,040	100,708,508	44,544,520	14,801,254	6,084,681	6,968,044	24,832,033
From chartered cars.....	251,588	70,986	57,210	13,466	7,571	34,044	78,311
From freight.....	780,444	10,904	128,234	88,172	36,192	241,082	275,860
From mail.....	390,256	199,829	72,981	17,841	14,172	25,303	60,130
From express.....	377,499	52,369	7,191	3,584	10,006	160,604	143,685
From sale of electric current for light and power.....	1,196,025	425,925	148,374	151,407	138,156	17,173	314,990
From miscellaneous sources.....	3,081,245	1,427,610	630,868	281,171	136,691	194,392	410,523

¹ Exclusive of reports for 16 companies which failed to furnish this information.

TABLE 47.—PERCENTAGE DISTRIBUTION, BY SOURCES, OF OPERATING EARNINGS OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Operating earnings.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
From passengers.....	97.0	97.9	97.7	96.4	94.6	91.2	95.1
From chartered cars.....	0.1	0.1	0.1	0.1	0.1	0.4	0.3
From freight, mail, and express.....	0.8	0.2	0.5	0.7	1.0	5.6	1.8
From sale of electric current for light and power.....	0.6	0.4	0.3	1.0	2.2	0.2	1.2
From miscellaneous sources.....	1.5	1.4	1.4	1.8	2.1	2.6	1.6

The proportion which passenger earnings bear to the total earnings depends primarily on the amount of income from light and power, and it is therefore quite different, in some of the population groups, when electric surface companies without lighting plants are considered alone, from that which appears for all classes of companies combined, including those selling light and power in a commercial way. For all companies the proportion of passenger earnings to total earnings is greatest in the centers of more than 500,000 population, and, decreasing with population, becomes smallest in those of less than 25,000 inhabitants.

The receipts from chartered cars in all classes of urban centers are exceedingly small. The item of earnings from chartered cars is of somewhat greater significance on interurban railways, constituting four-tenths of 1 per cent of the total earnings of fast, long interurban railways and three-tenths of 1 per cent of the earnings of other interurban lines. It is not uncommon for pleasure parties to avail themselves of the convenience and comfort of chartered interurban cars for long journeys into the country or for visits to neighboring towns and cities.

The earnings of urban street railways from freight, mail, and express service are insignificant as compared with their passenger earnings. The distinction between freight and express traffic as made by street and electric railways is not a very precise one, and these two items in the tables should therefore be considered jointly. The earnings from these two sources are relatively greater in small cities than in the larger cities. The freight and express business of the interurban railways of both classes is much more important than that of urban railways. The total revenue of fast, long interurban railways from freight, mail, and express traffic amounted to \$500,922, or 4.9 per cent of the gross earnings of all interurban companies of this class.

There are striking differences among the various urban groups in regard to the proportion of earnings derived from the sale of electric light and power. If companies of all classes, including those furnishing commercial lighting, be considered together, it will be found that whereas only two-fifths of 1 per cent of the earnings of companies in urban centers of more than 500,000 inhabitants were derived from light and power, the corresponding proportion in cities under 25,000 inhabitants was 19 per cent. For reasons elsewhere suggested (page 13) it is much more common to find railway business combined with light and power business in small and medium-sized cities than in large ones. Several interurban railway companies of both classes also operated lighting plants and derived a considerable amount of earnings from them.

When attention is confined to those electric surface railway companies which are not regarded by the Bureau of the Census as doing a commercial lighting business, it appears that the earnings from the incidental sale of electric current were also greater among companies in urban centers of less than 100,000 inhabitants than among companies in the larger cities.

The various population groups do not show a wide divergence as regards the proportion which the earnings of railway companies from miscellaneous sources bear to the total earnings. On the face of the returns the proportion of receipts from such sources was distinctly greater in urban centers of less than 25,000 inhabitants than in the larger centers. This is probably attributable, at least in part, to the failure of companies in these towns to distinguish strictly between miscellaneous earnings, which are properly assignable to street railway operation, and miscellaneous income, which is derived from property entirely distinct from the street railway business. The miscellaneous receipts are made up of such a wide variety of items that it is impossible, in the absence of the exact figures for each item, to derive any significant comparisons from the totals for groups. One would, perhaps, expect the receipts from advertising to be comparatively larger in great cities than in those of smaller population, and this opinion seems to be confirmed by such incomplete data regarding the earnings from advertising as appear in the original schedules.

Operating earnings, by states.—Table 48 presents the sources of operating earnings, by states and territories.

The proportions of the earnings from different sources in a given state depend in considerable measure upon the size of the cities in which its street railway companies operate and upon the presence or absence of interurban railways. Thus the earnings from freight, mail, and express service combined are relatively much larger in Ohio and Michigan than elsewhere, because the interurban railways in those states have developed this class of traffic to a considerable degree. The companies of Maryland derived a greater proportion of their revenue from carrying mail than the companies of any other state, although this item was also considerable in Illinois, Missouri, and Massachusetts. Receipts from the sale of electric current for light and power constituted a larger proportion of total earnings in several of the Southern and Western states, where the total business of the companies is comparatively small, than in the leading Northern states. A considerable income was, however, derived from the sale of light and power by the street and interurban railways of Connecticut, Ohio, Illinois, Iowa, and Wisconsin.

STREET AND ELECTRIC RAILWAYS.

TABLE 48.—ANALYSIS OF GROSS EARNINGS FROM OPERATION, BY STATES AND TERRITORIES: 1902.¹

STATE OR TERRITORY.	Number of companies.	Total.	FROM—						
			Passengers.	Chartered cars.	Freight.	Mall.	Express.	Sale of electric current for light or power.	Miscellaneous.
United States	799	\$247,553,999	\$233,821,548	\$303,606	\$1,038,097	\$432,080	\$401,672	\$7,703,574	\$3,853,420
Alabama	9	1,497,351	1,135,266	2,211	34,494	1,415	1,362	318,660	3,943
Arkansas	7	371,560	322,805	114	26			45,630	2,985
California	35	9,967,288	9,464,723	3,637	47,625	20,116	3,576	279,216	148,395
Colorado	7	2,227,286	2,091,824	8,106		2,000		111,104	14,252
Connecticut	21	4,284,089	3,829,094	12,435	16,652	6,807	16,660	348,237	54,204
Delaware	3	500,412	476,589	494	2,270			5,112	15,997
Florida	6	529,743	411,533	667	2,486	515		110,363	4,179
Georgia	10	2,375,221	1,594,982	4,972	9,772	440	150	727,847	37,061
Illinois	48	24,164,965	23,270,828	12,615	23,165	42,596	10,148	519,958	285,655
Indiana	26	3,813,076	3,532,579	6,858	18,781	1,977	17,893	144,323	90,665
Iowa	22	2,384,421	1,959,965	954	17,548	5,299	9,132	296,730	94,793
Kansas	11	370,481	343,197	200		566		23,007	3,511
Kentucky	12	2,932,901	2,780,487	1,407	2,500	2,168	4,162	133,337	8,840
Louisiana	8	2,910,244	2,835,262	4,457		1,682		37,753	31,090
Maine	19	1,542,508	1,311,198	251	80,380	6,179	9,409	102,318	32,773
Maryland	10	4,898,627	4,748,425	520	15,343	33,372	11,169	10,843	78,955
Massachusetts	74	23,617,570	22,807,316	43,182	12,876	48,454	4,140	250,109	451,493
Michigan	24	6,494,691	6,014,842	20,313	47,904	11,143	153,224	195,428	51,837
Minnesota	5	3,727,648	3,650,483	4,138		4,335		49,680	19,012
Mississippi	5	258,654	154,597	113				103,236	708
Missouri	16	10,691,220	10,422,536	5,652	7,379	41,071	4,392	172,036	38,154
Montana	5	492,023	382,452		50,544	365	34	43,284	15,344
Nebraska	4	1,148,994	1,107,494	1,044		2,698		35,073	2,685
New Hampshire	7	604,131	579,546		1,182	4,050	120	10,625	8,608
New Jersey	25	8,137,477	7,989,544	21,585	5,364	4,822	96	15,459	100,607
New York	96	59,315,606	57,847,930	53,418	197,324	65,077	64,213	471,509	1,116,135
North Carolina	7	437,259	247,812	75	8,367		1,500	163,657	15,848
Ohio	62	16,587,693	15,293,916	37,450	211,842	35,171	57,679	602,619	349,016
Oregon	6	1,042,895	969,231	507	17,287	2,904	163	33,522	19,281
Pennsylvania	98	30,319,211	29,537,284	24,407	35,563	61,377	28,477	138,602	493,501
Rhode Island	7	2,964,260	2,874,255	1,963	43,835	1,769	536	25,687	16,215
South Carolina	7	597,577	401,553	61	16,579	1,504		171,562	6,318
Tennessee	8	1,866,835	1,759,680	68	1,239	4,886		86,901	14,111
Texas	17	1,547,846	1,501,188	2,250	3,000	565	719	20,859	19,275
Utah	3	561,328	547,875	1,197		800		1,571	9,885
Vermont	9	249,228	216,013		23,351	2,201	1,768		5,896
Virginia	16	1,553,478	1,103,732	2,036	12,791	1,617	368	387,031	45,903
Washington	8	2,542,906	1,613,156	3,233	63,501	1,883		641,800	19,333
West Virginia	8	1,102,171	968,805	100	6,160	755		126,117	10,234
Wisconsin	17	3,902,059	3,155,168	11,489		765	582	690,284	43,771
All other states and territories ²	11	3,021,063	2,876,433	9,429	967	8,796		52,485	72,963
Hawaii and Porto Rico	5	515,913	485,258	301	25			26,454	3,875

¹ Exclusive of reports for 18 companies which failed to furnish this information.² Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

III.

ANALYSIS OF OPERATING EXPENSES.

Detailed analysis, by states.—Table 49 presents for the United States and for each state an analysis of the operating expenses of street railways under six main divisions and thirty-nine subdivisions. The classification of expenses is that adopted by the American Street Railway Accountants' Association. In the appendix to this report will be found a detailed list of the different items of expenditure which, according to the rules of that association, are to be included in each of the divi-

sions and subdivisions. This classification applies less satisfactorily to animal power, elevated, and steam railways than to electric and cable railways, and less satisfactorily to electric railways having commercial lighting plants than to those without them. Nevertheless, electric railway companies without commercial lighting plants do such a large proportion of the total business for all classes of companies that the totals of the table, which include all operating companies, may be regarded as showing in a fairly accurate manner the distribution of expenses of this class of companies.

STREET AND ELECTRIC RAILWAYS.

TABLE 49.—ANALYSIS OF OPERATING

1	STATE OR TERRITORY.	Number of companies.	Aggregate.	MAINTENANCE.							
				Ways and structures.				Equipment.			
				Total.	Track and roadway.	Electric, cable, etc., lines.	Buildings and fixtures.	Total.	Steam plant.	Electric, cable, etc., plant.	Cars.
1	United States	799	\$142,312,597	\$12,118,296	\$8,158,631	\$2,959,182	\$1,000,483	\$16,676,532	\$1,353,789	\$826,604	\$7,659,428
2	Alabama.....	9	878,291	71,473	57,864	11,218	2,391	114,402	4,828	5,845	60,243
3	Arkansas.....	7	216,433	18,959	16,214	1,589	1,156	19,405	3,432	249	9,873
4	California.....	35	5,402,245	530,602	292,041	219,005	19,556	621,653	49,956	86,183	291,809
5	Colorado.....	7	1,300,606	187,192	119,560	60,747	6,885	128,618	14,412	8,442	59,333
6	Connecticut.....	21	2,773,608	328,496	239,290	72,957	16,248	289,765	16,798	5,933	125,372
7	Delaware.....	3	360,590	11,657	7,036	4,317	304	35,090	2,196	3,175	9,994
8	Florida.....	6	339,375	20,708	15,714	3,689	1,305	26,270	6,373	696	10,595
9	Georgia.....	10	1,232,320	50,864	26,726	19,730	4,408	101,608	3,474	2,370	42,696
10	Illinois.....	48	14,108,211	1,052,973	697,579	274,732	80,662	1,999,348	148,157	278,072	1,021,645
11	Indiana.....	26	2,219,791	194,751	133,433	49,938	11,380	305,976	38,552	22,490	102,543
12	Iowa.....	22	1,460,993	159,559	121,850	29,989	7,720	156,305	16,421	8,137	62,785
13	Kansas.....	11	257,248	24,751	17,406	6,108	1,237	29,231	1,838	2,919	19,905
14	Kentucky.....	12	1,560,270	235,169	170,487	47,904	16,778	145,385	15,916	3,713	84,647
15	Louisiana.....	8	1,758,989	162,924	100,511	55,444	6,969	244,121	40,409	22,765	101,327
16	Maine.....	19	1,127,660	144,860	96,232	21,287	27,341	157,745	6,203	7,263	77,336
17	Maryland.....	10	2,312,323	120,257	76,886	36,751	6,620	284,097	12,641	7,884	129,560
18	Massachusetts.....	74	16,408,667	1,513,832	991,972	382,098	139,762	1,895,793	170,050	43,656	964,128
19	Michigan.....	24	3,655,328	324,077	224,484	75,081	24,512	424,800	24,409	31,425	165,231
20	Minnesota.....	5	1,719,687	92,707	73,745	10,268	8,694	221,043	5,932	3,575	81,492
21	Mississippi.....	5	192,056	16,467	10,763	5,175	529	14,857	2,013	1,358	7,525
22	Missouri.....	16	6,071,971	413,488	205,575	180,607	27,306	767,517	82,497	17,121	357,791
23	Montana.....	5	365,073	39,107	33,873	2,509	2,725	28,317	328	212	14,522
24	Nebraska.....	4	655,729	121,848	81,432	39,274	1,142	63,765	4,760	8,041	26,685
25	New Hampshire.....	7	478,849	35,199	24,990	7,798	2,411	48,540	842	188	21,380
26	New Jersey.....	25	4,324,112	270,285	184,007	63,588	22,690	576,440	31,694	22,525	236,151
27	New York.....	96	33,677,724	2,404,843	1,461,861	592,247	350,735	3,771,757	179,600	75,690	1,681,432
28	North Carolina.....	7	322,344	29,097	16,805	9,524	2,768	28,215	3,219	1,772	14,084
29	Ohio.....	62	9,132,480	787,224	572,541	178,817	35,866	863,348	77,249	31,120	372,540
30	Oregon.....	6	653,912	69,923	51,680	12,007	6,236	86,486	5,218	7,177	42,225
31	Pennsylvania.....	98	15,624,813	1,553,534	1,206,082	263,968	83,484	2,037,248	265,447	58,374	927,969
32	Rhode Island.....	7	1,892,477	282,185	220,484	50,907	10,794	214,961	27,501	11,820	93,842
33	South Carolina.....	7	398,662	23,956	14,089	4,894	4,973	35,435	3,302	1,626	16,083
34	Tennessee.....	8	1,079,237	96,734	71,996	15,984	8,754	126,352	2,620	2,561	71,416
35	Texas.....	17	993,600	111,110	84,057	20,890	6,163	110,395	5,489	2,662	59,880
36	Utah.....	3	356,879	54,609	45,578	7,249	1,782	41,187	1,569	935	14,041
37	Vermont.....	9	201,179	26,183	20,100	3,254	2,829	20,705	304	866	7,916
38	Virginia.....	16	1,009,356	94,060	57,431	25,036	11,593	98,804	9,666	10,280	42,950
39	Washington.....	8	1,576,018	186,485	143,561	29,097	13,827	135,767	16,979	12,639	59,272
40	West Virginia.....	8	652,862	48,946	35,151	10,968	2,807	48,669	3,889	823	24,417
41	Wisconsin.....	17	1,995,024	137,461	93,234	34,692	9,535	165,173	35,111	11,947	60,991
42	All other states and territories ¹	11	1,575,605	69,742	44,311	17,825	7,606	191,929	12,495	2,075	65,802
43	Hawaii and Porto Rico.....	5	330,350	20,799	15,597	2,126	3,076	27,677	1,556	330	13,434

¹ Exclusive of reports for 18 companies which failed to furnish this information.² Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

FINANCIAL OPERATIONS.

73

EXPENSES, BY STATES AND TERRITORIES: 1902.¹

MAINTENANCE—continued.				TRANSPORTATION.								
Equipment—Continued.			Operation of power plant.						Operation of cars.			
Electric, cable, etc., equipment of cars.	Miscellaneous.	Miscellaneous shop expenses.	Total.	Wages.	Fuel.	Water.	Lubricants and waste.	Miscellaneous supplies and expenses.	Hired power.	Total.	Superintendence of transportation.	Wages of conductors.
\$5,325,125	\$668,875	\$842,711	\$23,062,328	\$4,599,487	\$12,827,322	\$634,026	\$500,967	\$629,008	\$3,871,518	\$62,454,679	\$2,598,985	\$24,070,921
36,762	3,436	3,288	114,063	23,074	67,684	4,140	3,233	1,479	14,453	300,598	20,273	105,877
5,290	105	456	55,129	15,317	26,814	2,183	2,075	162	8,548	87,830	2,551	21,905
157,048	21,461	15,196	878,716	186,522	428,453	4,388	14,152	20,451	224,750	2,762,258	73,246	1,181,880
39,552	1,875	5,004	240,298	73,144	136,386	3,509	3,820	1,925	21,514	531,548	16,032	224,862
114,756	5,754	21,152	438,707	102,549	260,027	8,000	9,855	8,211	50,065	1,114,410	30,914	442,579
13,916	1,319	4,480	84,804	15,384	61,600	1,527	3,297	310	2,686	134,871	1,680	60,080
7,804	200	602	65,281	14,798	47,652	175	1,505	1,151	102,453	6,286	39,399	
40,386	2,805	9,877	176,835	41,571	113,619	8,086	7,628	3,784	2,147	400,180	9,451	158,480
388,439	59,430	103,605	2,353,311	476,336	1,306,304	49,239	37,869	80,584	402,979	5,825,552	89,704	2,444,620
115,675	2,234	24,482	363,879	106,523	223,900	3,312	12,100	7,441	10,603	847,307	27,146	332,116
47,020	8,581	13,361	293,226	74,084	187,345	4,432	8,362	5,436	13,567	513,727	13,192	177,629
3,022	585	962	44,452	16,790	24,986	591	1,569	516	102,482	5,060	27,020	
32,570	1,492	7,047	184,764	46,165	100,244	4,902	6,700	13,547	13,146	653,671	58,187	99,084
66,198	3,414	10,008	295,083	76,026	172,626	511	20,607	23,313	2,000	831,936	10,610	346,139
56,429	1,960	8,554	200,531	62,744	84,798	27,501	4,347	6,278	24,863	377,503	18,059	141,941
132,124	73	1,815	461,108	99,296	268,550	9,847	5,303	2,203	85,909	1,017,517	25,448	443,261
672,204	28,057	17,698	2,573,845	469,865	1,522,155	63,347	47,979	43,435	427,064	7,444,107	640,791	2,660,947
168,807	13,027	21,901	660,257	175,669	393,744	1,527	20,472	14,073	54,772	1,576,731	56,533	592,063
125,793	1,850	2,401	263,689	48,538	69,792	2,023	2,541	7,005	133,790	784,491	21,488	299,127
3,111	661	189	61,945	14,073	39,643	2,441	2,659	1,511	1,618	40,765	1,395	15,229
240,660	10,753	58,695	970,997	242,381	643,115	47,332	26,959	7,560	3,650	2,713,951	90,849	1,109,345
11,349	710	1,196	58,963	12,053	19,282	1,363	797	1,098	24,390	140,188	600	57,842
24,164	115	122,058	29,539	86,296	3,690	3,690	2,533	264,686	1,875	119,273	1,875	119,273
18,572	1,308	6,250	134,413	21,144	38,348	1,349	1,611	1,584	70,377	162,911	7,549	67,679
238,141	19,463	28,466	753,759	112,188	301,284	17,312	14,309	17,218	291,448	1,907,598	56,302	745,342
1,147,418	381,005	306,612	5,266,237	659,583	3,012,882	259,145	85,833	263,583	965,711	15,420,303	721,132	5,528,938
7,939	701	500	78,996	16,959	48,399	1,588	2,964	700	8,386	79,180	4,288	29,088
294,688	19,491	68,260	1,616,321	413,639	963,623	33,839	46,376	31,463	127,381	4,211,137	113,153	1,663,807
30,400	1,413	53	108,877	29,980	26,022	12	3,430	1,242	49,191	293,011	9,405	126,473
707,628	39,570	38,260	2,056,849	579,052	1,060,602	29,197	60,638	16,872	310,288	7,267,220	281,830	3,071,514
58,220	4,665	18,943	296,212	48,397	170,237	15,208	4,165	6,021	52,189	792,790	31,513	304,091
7,351	6,640	433	55,636	7,619	32,019	280	1,027	429	14,262	135,242	16,906	37,931
38,138	1,229	10,398	163,842	21,759	72,189	3,315	4,081	1,878	60,620	409,102	25,700	164,145
35,788	1,459	5,117	177,436	30,359	63,843	1,133	3,375	3,450	75,276	376,369	16,338	129,006
23,467	708	467	59,881	2,679	5,407	188	402	44	51,161	162,996	7,100	65,506
9,312	1,579	728	41,449	3,989	10,005	711	219	26,525	90,641	5,210	38,683	
32,971	1,250	1,687	243,083	49,806	144,727	6,721	7,180	3,473	31,176	319,064	17,734	114,522
37,102	6,386	3,389	274,662	48,888	141,364	3,374	3,589	9,491	67,956	515,418	9,980	222,103
15,783	2,279	1,478	97,029	36,655	47,276	2,572	3,055	1,439	6,032	278,868	6,582	110,890
46,120	8,394	2,610	390,939	72,092	261,830	2,527	7,290	14,884	32,316	716,787	34,856	269,268
73,013	1,448	17,096	284,746	42,228	143,250	2,205	4,809	3,545	88,709	747,278	21,947	286,237
9,385	1,586	1,386	55,827	10,617	37,829	1,013	1,097	571	4,200	110,797	3,969	35,238

STREET AND ELECTRIC RAILWAYS.

TABLE 49.—ANALYSIS OF OPERATING

STATE OR TERRITORY.	TRANSPORTATION—continued.							MISCELLANEOUS.		
	Operation of cars—Continued.							Total.	Salaries of general officers.	Salaries of clerks.
	Wages of motormen.	Wages of other car service employees.	Wages of car house employees.	Car service supplies.	Miscellaneous car service expenses.	Cleaning and sanding track.	Removal of snow and ice.			
1 United States.....	\$24,662,872	\$2,595,652	\$3,214,606	\$1,905,155	\$1,924,599	\$730,961	\$750,969	\$25,812,009	\$2,998,123	\$2,237,723
2 Alabama.....	112,639	7,439	32,738	8,268	8,293	5,071	.....	124,105	24,701	8,922
3 Arkansas.....	44,175	1,188	14,687	1,700	982	639	8	33,555	9,099	5,502
4 California.....	1,187,715	103,147	81,833	66,925	30,826	36,585	601	609,016	106,628	94,947
5 Colorado.....	231,261	3,888	16,624	12,332	15,079	9,672	1,798	208,680	38,813	30,189
6 Connecticut.....	442,425	32,096	57,614	16,067	29,186	28,604	34,925	419,887	127,904	44,372
7 Delaware.....	60,080	4,934	3,973	1,450	882	361	1,431	94,178	6,400	5,181
8 Florida.....	37,851	1,656	11,081	2,418	1,332	2,430	.....	62,139	18,398	11,752
9 Georgia.....	170,243	17,304	24,162	5,320	8,549	6,671	.....	218,135	46,222	22,677
10 Illinois.....	2,094,870	302,081	353,302	147,441	268,683	102,580	27,271	2,819,259	237,996	164,765
11 Indiana.....	364,174	9,725	56,123	21,357	18,884	13,572	4,210	406,474	93,060	46,184
12 Iowa.....	230,912	16,505	45,349	12,502	9,673	3,284	4,681	259,804	47,738	24,734
13 Kansas.....	53,331	2,843	4,413	5,324	1,686	2,062	673	50,053	16,590	3,630
14 Kentucky.....	288,499	28,914	23,244	72,591	74,510	7,852	1,290	313,510	44,832	15,914
15 Louisiana.....	351,266	18,886	63,990	9,569	20,017	11,459	.....	221,128	53,567	23,927
16 Maine.....	142,135	10,593	16,968	4,463	27,594	2,290	13,460	197,793	22,998	20,896
17 Maryland.....	446,404	17,980	32,000	31,231	13,845	3,679	3,669	422,437	40,909	61,654
18 Massachusetts.....	2,711,885	372,823	419,198	55,799	289,900	96,241	197,523	2,933,327	266,635	248,465
19 Michigan.....	631,592	68,555	117,433	41,790	45,196	10,418	13,151	657,699	125,835	78,296
20 Minnesota.....	294,234	29,231	75,107	26,870	21,401	12,915	4,118	327,960	43,234	36,996
21 Mississippi.....	17,351	.....	3,727	1,185	758	1,120	.....	49,362	12,969	4,640
22 Missouri.....	1,100,274	61,838	183,694	60,425	71,066	43,461	2,999	1,179,639	136,140	85,021
23 Montana.....	51,886	150	5,980	15,456	2,263	5,342	669	76,738	11,150	7,175
24 Nebraska.....	119,695	11,597	5,134	4,955	163	527	1,462	83,372	17,007	7,725
25 New Hampshire.....	67,630	3,645	7,197	2,736	963	180	5,332	95,299	9,068	4,978
26 New Jersey.....	753,769	108,906	95,787	69,409	48,562	12,759	16,762	804,551	107,036	64,824
27 New York.....	5,796,023	1,001,318	619,944	873,777	556,546	72,320	250,285	6,632,892	428,451	539,651
28 North Carolina.....	29,762	6,619	3,023	4,396	600	1,004	400	57,135	14,275	7,424
29 Ohio.....	1,761,552	136,863	281,003	82,773	87,762	71,511	12,713	1,553,649	269,697	150,200
30 Oregon.....	126,626	7,456	9,383	6,991	1,695	4,045	937	87,588	20,733	14,910
31 Pennsylvania.....	3,080,059	76,240	290,284	145,273	97,860	103,546	120,614	2,707,610	223,299	220,163
32 Rhode Island.....	300,305	21,438	68,672	22,770	11,456	16,027	16,518	306,309	25,777	15,356
33 South Carolina.....	38,277	4,956	11,154	2,722	20,903	2,365	28	63,416	17,260	4,609
34 Tennessee.....	176,851	6,223	11,954	13,340	6,288	4,464	137	237,734	32,075	14,673
35 Texas.....	182,270	10,047	18,744	6,604	6,073	7,249	38	218,290	56,623	15,914
36 Utah.....	75,069	.....	5,705	2,129	4,790	1,907	802	38,204	9,900	2,440
37 Vermont.....	34,109	5,049	6,106	1,812	2,158	230	2,284	22,201	6,046	1,967
38 Virginia.....	114,326	16,749	15,594	15,184	22,739	1,906	310	204,951	42,152	15,676
39 Washington.....	222,087	10,368	24,308	3,434	15,849	2,429	4,860	311,290	50,775	35,095
40 West Virginia.....	118,573	4,037	7,034	4,011	23,790	2,422	1,529	106,707	26,284	13,173
41 Wisconsin.....	310,462	4,437	45,474	11,600	27,492	10,517	2,681	307,023	53,591	25,847
42 All other states and territories.....	290,185	47,928	45,365	10,756	33,300	10,765	795	281,910	52,247	37,256
43 Hawaii and Porto Rico.....	58,257	1,222	3,887	2,079	826	4,319	.....	95,366	8,959	14,098

FINANCIAL OPERATIONS.

75

EXPENSES, BY STATES AND TERRITORIES: 1902—Continued.

MISCELLANEOUS—continued.												Wages, supplies, and expenses incidental to electric service not elsewhere included.	
Printing and stationery.	Miscellaneous office expenses.	Storeroom expenses.	Stable expenses.	Advertising and attractions.	Miscellaneous general expenses.	Damages.	Legal expenses in connection with damages.	Other legal expenses.	Rent of land and buildings.	Rent of track and terminals.	Insurance.		
\$496,381	\$666,997	\$229,237	\$1,430,000	\$1,122,816	\$2,061,821	\$7,529,946	\$1,865,599	\$1,017,854	\$608,344	\$1,471,298	\$2,080,875	\$2,188,753	1
3,896	4,850	3,040	6,832	11,078	10,966	31,054	6,266	1,100	3,473	355	7,572	153,650	2
620	510	617	3,838	569	5,636	2,976	387	593	202		3,006	1,556	3
12,053	25,143	21,763	32,956	35,547	26,578	130,769	52,707	14,045	2,100	3,299	51,481		4
3,682	5,394	5,645	8,419	32,959	20,962	36,340	8,557	5,102	5,240		12,388	4,270	5
7,615	10,139	2,922	9,235	47,336	28,454	46,856	8,989	30,327	4,002	5,283	46,453	182,344	6
1,616	1,137	150	888	12,412	3,863	16,772	3,700	253	99	34,035	7,672		7
1,356	1,867	684	1,012	8,025	8,499	3,514	1,680	1,682			3,670	62,524	8
6,128	2,751	1,957	3,597	28,297	9,548	62,080	5,660	7,336	4,567	3,495	13,820	284,698	9
28,933	45,984	23,435	95,424	28,645	226,542	913,117	275,468	173,202	55,228	463,528	87,043	52,768	10
8,913	11,134	9,624	7,716	31,887	51,013	59,839	13,283	14,962	8,668	31,606	20,585	99,404	11
7,765	4,962	3,081	5,750	40,183	35,388	38,498	8,821	9,495	6,925	6,005	20,469	78,372	12
1,593	340		4,511	3,454	2,490	7,340	5,269	590	858	100	3,288	6,279	13
8,838	9,041	20,036	4,088	14,844	84,324	60,759	9,691	13,507	3,355	6,600	18,181	27,771	14
4,467	5,627	3,846	13,882	13,109	26,096	38,270	200	13,137	931	820	23,309	3,797	15
4,642	4,015		4,776	45,130	32,128	25,629	1,376	880	8,662	5,596	21,065	49,228	16
11,096	8,006	110	14,694	2,216	45,401	164,913	11,344	5,499	451	200	55,944	6,907	17
111,795	71,325	10,882	34,459	92,324	203,366	664,562	195,160	53,609	139,111	366,935	474,699	42,763	18
21,597	29,188	6,258	5,823	56,524	92,871	121,038	16,733	27,596	16,920	17,663	41,357	11,764	19
6,429	4,971	10,188	4,644	6,195	56,710	106,669	18,227	8,750	4,265		20,682	29,797	20
1,187	2,014		1,181	2,567	3,461	12,509	2,615	1,447	2,023		2,759	8,660	21
16,517	12,829	14,796	24,704	50,227	97,304	568,369	51,415	37,218	5,454	7,617	72,038	26,379	22
413	1,286	25	120	39,150	6,707	3,456	100	2,500	2,442		2,214	21,740	23
4,587	461		1,205		9,109	30,040	2,500	2,400			8,335		24
4,456	6,928	128	3,637	16,288	8,527	12,113	2,568	419	7,665	36	18,448	2,487	25
38,335	19,379	12,650	22,585	15,660	23,378	318,119	45,352	39,849	12,958	30,488	53,938	11,479	26
54,275	137,944	37,015	1,008,873	111,378	325,300	2,173,259	831,019	232,655	120,749	205,935	426,388	181,692	27
1,742	2,935	560	510	13,133	2,809	5,059	949	2,472	400	687	4,180	49,721	28
36,343	36,743	15,785	24,334	58,975	201,350	340,695	102,110	65,468	50,946	92,899	108,104	100,801	29
4,089	5,023		2,888	2,310	5,571	10,381	3,840	5,201	1,810	5,073	5,759	8,027	30
48,783	146,883	3,274	41,238	191,976	248,862	894,338	115,915	128,745	23,555	156,225	264,404	2,352	31
122	4,867		532	783	12,200	165,357	450	21,313	32,955		26,597		32
632	2,544	1,718	1,872	11,122	9,228	12,478	1,020	399	642		4,852	79,977	33
4,716	3,180	1,738	6,631	4,010	18,849	58,203	10,165	12,421	60,501		10,572	45,473	34
5,541	5,770	1,585	8,724	14,927	12,452	62,481	13,260	7,248	3,350	1,111	9,304		35
2,689	1,455		1,630	961	3,326	7,454	3,121	1,000			4,208		36
533	446		2,704	3,629	3,275	387	100	445	746		1,923		37
4,717	7,363	2,948	525	24,531	17,577	23,676	4,380	17,004	5,672	16,647	22,083	49,394	38
1,559	9,352	3,275	268	32,957	25,565	89,989	15,062	18,410	5,815	1,389	21,479	152,396	39
930	1,623		450	1,715	14,482	28,004	1,060	6,294	1,342		11,350	72,643	40
5,758	5,735	5,158	9,132	6,359	19,330	99,605	9,933	14,826	2,338		49,411	277,641	41
5,233	5,573	4,354	8,713	9,904	22,334	82,979	5,127	18,455	1,924	7,666	19,845		42
1,561	344	903	54,142	3,018	3,225	1,570	1,453	1,983	624		3,186	20,384	43

Table 50 shows, for all companies, the percentage which each subdivision of operating expenses bears to the total operating expenses.

TABLE 50.—Percentage distribution of operating expenses of operating companies: 1902.

ITEM OF EXPENSE.	Percent- age of total oper- ating expenses.	ITEM OF EXPENSE.	Percent- age of total oper- ating expenses.
Aggregate	100.0	Car service supplies	1.3
Maintenance of ways and structures, total	8.5	Miscellaneous car serv- ice expenses	1.4
Track and roadway	5.7	Cleaning and sanding track	0.5
Electric, cable, etc., lines	2.1	Removal of snow and ice	0.6
Buildings and fixtures	0.7	Miscellaneous, total	18.1
Maintenance of equipment, total	11.7	Salaries of general offi- cers	2.1
Steam plant	0.9	Salaries of clerks	1.6
Electric, cable, etc., plant	0.6	Printing and stationery	0.3
Cars	5.4	Miscellaneous office ex- penses	0.5
Electric, cable, etc., equipment of cars	3.7	Storeroom expenses	0.2
Miscellaneous	0.5	Stable expenses	1.0
Miscellaneous shop ex- penses	0.6	Advertising and attrac- tions	0.8
Operation of power plant, total	16.2	Miscellaneous general expenses	1.4
Wages	3.2	Damages	5.3
Fuel	9.0	Legal expenses in con- nection with damages	1.3
Water	0.5	Other legal expenses	0.7
Lubricants and waste	0.4	Rent of land and build- ings	0.4
Miscellaneous supplies and expenses	0.4	Rent of track and termi- nals	1.0
Hired power	2.7	Insurance	1.5
Operation of cars, total	43.9	Wages, supplies, and expen- ses incidental to electric service not elsewhere in- cluded	1.6
Superintendence of trans- portation	1.8		
Wages of conductors	16.9		
Wages of motormen	17.3		
Wages of other car serv- ice employees	1.8		
Wages of car house em- ployees	2.3		

It will be seen that almost exactly one-fifth of the total operating expenses were devoted to the maintenance of ways and equipment, while the operation of the power plant, of which cost of fuel is the most important item, required one-sixth of the total expenditure. A considerable number of street railways hire their electric current, either from other street railways, or, more often, from electric light companies, while, in a few instances, steam power is similarly hired. The aggregate expenditure for hired power in 1902 was about one-sixth of the expenditure of all companies for power. By far the most important class of expenditures is that designated as for "operation of cars," which amounted to 43.9 per cent of the total. The wages of conductors and motormen constituted more than one-third of the entire cost of street railway operation. The item "superintendence of transportation" can not,

in the case of some railways, be accurately separated from the item "salaries of general officers and clerks," but these instances are not of sufficient importance to affect materially the totals for the country.

A considerable part of the expenditure under the head "advertising and attractions" consists of the cost of maintaining parks and other places of amusement. The revenue derived by street railway companies from such enterprises has been deducted and the item, therefore, represents only net expenditure. The most important of the miscellaneous expenses is that for damages, mostly in personal-injury cases. No less than \$7,529,946 was paid by street railway companies for damages in 1902, while the legal expenses connected with claims and suits for damages raised the total expense to \$9,395,545, which was one-fifteenth of the total operating expenses of all street railway companies. The companies very generally complain that the public and the courts treat them unfairly in the matter of claims and suits for damages. They allege that there is too general a readiness to blame the railways for injuries which are due wholly or largely to the carelessness of the injured person, and that juries are prone to assess damages at an unreasonable figure.

The item "wages, supplies, and expenses incident to electric service" was not reported in a uniform manner by all companies. It is intended to represent the expense peculiar to the production and distribution of electric current for light and power, as distinguished from expenses of the railway business proper. Some companies which sell light and power undertake to distinguish that part of their fuel and other power plant expenses, which is attributable to the lighting and power service, from that which is properly attributable to the railway operation. Other companies do not make such a segregation, but place under the last subdivision in the account only such expenses as are connected strictly with the distribution of current for light and power, excluding those due to its generation.

Operating expenses of companies, classified according to power.—Tables 51 and 52 present for the groups of railway companies, classified according to power used, the amount and percentage, respectively, of operating expenses falling under the six main divisions. In considering these statistics, it should be remembered that the ratio of operating expenses to operating earnings differs materially in the various groups of railways.

FINANCIAL OPERATIONS.

77

TABLE 51.—OPERATING EXPENSES OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric elevated.	Cable, surface and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.				
Number of companies.....	799	556	112	57	52	5	14	3
Operating expenses, total.....	\$142,312,597	\$118,236,568	\$12,834,941	\$1,439,174	\$1,077,736	\$8,151,926	\$552,812	\$19,440
Maintenance of ways and structures.....	12,118,296	10,290,505	1,035,566	107,028	50,723	567,689	62,570	4,215
Maintenance of equipment.....	16,676,532	14,443,364	1,115,563	143,375	68,366	848,272	53,740	3,832
Operation of power plant.....	23,062,328	18,199,604	2,487,822	325,991	—	1,937,877	108,609	2,425
Operation of cars.....	62,454,679	53,396,980	4,066,636	634,287	432,978	3,750,119	265,749	5,980
Miscellaneous.....	25,812,009	21,846,383	2,018,993	307,963	525,669	1,047,969	62,144	2,968
Wages, supplies, and expenses incidental to electric service, not elsewhere included.....	2,188,753	57,782	2,110,441	20,530	—	—	—	—

¹ Exclusive of reports for 18 companies which failed to furnish this information.

TABLE 52.—PERCENTAGE DISTRIBUTION OF OPERATING EXPENSES OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric elevated.	Cable, surface and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.				
Operating expenses, total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Maintenance of ways and structures.....	8.5	8.7	8.1	7.4	4.7	7.0	11.3	21.7
Maintenance of equipment.....	11.7	12.2	8.7	10.0	6.3	10.4	9.7	19.7
Operation of power plant.....	16.2	15.4	19.4	22.7	—	23.8	19.7	12.5
Operation of cars.....	43.9	45.2	31.7	37.1	40.2	46.0	48.1	30.7
Miscellaneous.....	18.2	18.5	15.7	21.4	48.8	12.6	11.2	15.4
Wages, supplies, and expenses incidental to electric service, not elsewhere included.....	1.5	(¹)	16.4	1.4	—	—	—	—

¹ Less than one-tenth of 1 per cent.

Animal power railways show the lowest proportion of expenditure for maintenance of ways and structures. This is due in part to the relatively simple construction and equipment of such lines and the low degree of wear and tear on them; in part, perhaps, to the disposition to let such properties, which are becoming anachronisms, run down rather than to maintain them.

The expense for the operation of power plant is naturally greater among electric railways which have commercial lighting plants than among those which do not, since the cost of producing current constitutes a greater proportion of the total operating expense in the lighting business than in the railway business. The large proportion of the expenditure of elevated railroads for operation of "power plant" is partly explained by the fact that the Manhattan Elevated Railway was largely operated by steam power during the census year, the fuel consumption of the locomotives being far greater proportionately than that of power-house engines. The company has since changed its motive power, and the report of the company for the year following that of the census inquiry shows a remarkable decrease in operating expenses per car mile

and in the ratio of expenses to earnings. Animal power railways present no item for power plant expenses, the stable expenses being included under the "miscellaneous" group, which is thus made relatively very much greater for such railways than for other classes.

The statistics of the three ordinary cable railways in San Francisco present a decidedly different distribution of expenses from that of the inclined planes which are combined with them in the foregoing tables. For the ordinary cable railways the proportions of the various classes of expense to the total operating expenses were: Maintenance of ways and structures, 11.25 per cent; maintenance of equipment, 11.15 per cent; operation of power plant, 13.13 per cent; operation of cars, 54.94 per cent; and miscellaneous expenses, 9.53 per cent.

Operating expenses of companies, classified according to population.—Tables 53 and 54 show the amount and percentage of the six main classes of operating expenses for all railway companies in the various urban and interurban groups. Similar statistics for full-time electric surface railway companies not furnishing commercial lighting are presented in Tables 55 and 56.

STREET AND ELECTRIC RAILWAYS.

TABLE 53.—OPERATING EXPENSES OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies	799	65	47	83	312	53	239
Operating expenses, total	\$142,312,597	\$67,300,048	\$27,308,769	\$13,430,577	\$8,068,172	\$6,076,983	\$20,058,048
Maintenance of ways and structures	12,118,296	5,126,079	2,520,809	1,362,758	710,918	541,414	1,866,318
Maintenance of equipment	16,676,532	8,599,760	2,886,438	1,390,604	796,703	753,184	2,249,843
Operation of power plant	23,082,328	9,641,891	3,863,120	2,176,316	1,984,154	1,339,441	4,057,406
Operation of cars	62,454,679	31,099,653	13,087,521	5,516,299	2,744,297	2,064,552	7,942,357
Miscellaneous	25,812,009	12,832,665	4,668,998	2,344,988	1,294,582	1,242,492	3,428,334
Wages, supplies, and expenses incidental to electric service, not elsewhere included	2,188,753	.....	281,883	689,612	557,568	135,900	523,790

¹ Exclusive of reports for 18 companies which failed to furnish this information.

TABLE 54.—PERCENTAGE DISTRIBUTION OF OPERATING EXPENSES OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Operating expenses, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Maintenance of ways and structures	8.5	7.6	9.2	10.1	8.8	8.9	9.3
Maintenance of equipment	11.7	12.8	10.6	10.3	9.9	12.4	11.2
Operation of power plant	16.2	14.3	14.2	16.2	24.5	22.0	20.2
Operation of cars	43.9	46.2	47.9	40.9	33.9	34.0	39.6
Miscellaneous	18.2	19.1	17.1	17.4	16.0	20.5	17.1
Wages, supplies, and expenses incidental to electric service, not elsewhere included	1.5	.....	1.0	5.1	6.9	2.2	2.6

TABLE 55.—OPERATING EXPENSES OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies	556	47	38	66	165	40	200
Operating expenses, total	\$118,236,568	\$58,089,586	\$24,684,272	\$9,366,539	\$4,388,638	\$4,579,621	\$17,127,912
Maintenance of ways and structures	10,290,506	4,506,096	2,306,248	1,016,903	437,370	422,570	1,601,318
Maintenance of equipment	14,443,364	7,686,901	2,648,411	1,019,886	476,065	607,826	2,004,775
Operation of power plant	18,199,604	7,665,085	3,457,884	1,519,183	996,542	1,034,890	3,526,020
Operation of cars	53,398,930	26,936,798	11,963,891	4,153,625	1,798,273	1,556,444	6,989,899
Miscellaneous expenses	21,846,383	11,294,706	4,307,838	1,657,442	680,388	957,891	2,948,118
Wages, supplies, and expenditures incidental to electric service, not elsewhere included	57,782	.....	.....	.....	.....	.....	57,782

¹ Exclusive of reports for 16 companies which failed to furnish this information.

TABLE 56.—PERCENTAGE DISTRIBUTION OF OPERATING EXPENSES OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Operating expenses, total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Maintenance of ways and structures	8.7	7.8	9.3	10.9	10.0	9.2	9.4
Maintenance of equipment	12.2	13.2	10.7	10.9	10.8	13.3	11.7
Operation of power plant	15.4	13.2	14.0	16.2	22.7	22.6	20.6
Operation of cars	45.2	46.4	48.5	44.3	41.0	34.0	40.8
Miscellaneous	18.5	19.4	17.5	17.7	15.5	20.9	17.2
Wages, supplies, and expenditures incidental to electric service, not elsewhere included	(¹)	.....	.....	.....	.....	.....	0.3

¹ Less than one-tenth of 1 per cent.

Tables 55 and 56, applying to a more homogeneous class of railways, are more significant than Tables 53 and 54, and the following discussion is accordingly confined to them. These tables reveal considerable differences among the population groups in the distribution of operating expenses. The expense of maintaining ways and structures is relatively least in urban centers of more than 500,000 inhabitants, as might be expected from the small proportion of trackage in such centers to the total amount of traffic. For the same reason, on the other hand, the largest cities, in which, presumably, cars see more and harder service than in small towns, show a greater proportion of expenditure for maintenance of equipment than appears in any other group except the fast, long interurban railways, on which, by reason of the high speed maintained, cars are subjected to severe wear and tear.

In the case of full-time electric surface railways without lighting plants there is a progressive increase in the proportion of expenses for the operation of power plant as we descend the scale of population of urban centers served. Other things being equal, the greater the density of traffic and the larger the scale on which the power plant is constructed, the lower will be the cost of power per unit of traffic. The fact that the proportion of expenses for power plant in the case of all classes of companies combined, is higher in the urban centers of the first group than in those of the second is due to the presence of elevated railways in the largest cities. That the expense for the operation of cars, which consists chiefly of wages, is a smaller proportion of the total in urban centers of less than 100,000 inhabitants than in larger urban centers is due chiefly to the lower rates of wages paid in the smaller towns. The higher proportion of miscellaneous expenses in urban centers of more than 500,000 inhabitants as compared with the other urban groups is chiefly attributable to the heavier damage expenses in such cities.

Operating expenses of 17 selected companies in the largest cities.—Since peculiar interest attaches to the operations of street railways in large cities, Table 57 has been prepared, which shows by percentages the distribution of operating expenses in detail for a group of 17 selected companies, situated in 10 of the largest urban centers in the United States. The companies included in the table are as follows: Boston Elevated Railway Company; Cleveland Electric Railway Company; Cleveland City Railway Company; Interurban Street Railway Company and Third Avenue Railroad Company, of New York; Brooklyn Rapid Transit Company; United Railways and Electric Company, of Baltimore; St. Louis Transit Company; Union Traction Company, of Phila-

delphia; Chicago City Railway Company; Chicago Union Traction Company; International Railway Company and Crosstown Street Railway Company, of Buffalo; Cincinnati Traction Company; United Railroads of San Francisco; Jersey City, Hoboken and Paterson Street Railway Company; and North Jersey Street Railway Company, of Jersey City, Newark, and vicinity. The aggregate operating expenses of these 17 companies were \$56,809,980, or about two-fifths of the total for the United States.

TABLE 57.—Percentage distribution of operating expenses for 17 selected electric surface railway companies in the largest cities: 1902.

Percentage of total operating expenses assignable to:	
Maintenance of ways and structures, total	8.1
Track and roadway	5.2
Electric, cable, etc., lines	2.2
Buildings and fixtures	0.7
Maintenance of equipment, total	12.8
Steam plant	0.9
Electric, cable, etc., plant	0.8
Cars	6.2
Electric, cable, etc., equipment of cars	3.8
Miscellaneous equipment	0.5
Miscellaneous shop equipment	0.6
Operation of power plant, total	12.7
Power plant wages	2.7
Fuel for power	7.2
Water for power	0.5
Lubricants and waste for power plant	0.2
Miscellaneous supplies and expenses of power plant	0.3
Hired power	1.8
Operation of cars, total	47.3
Superintendence of transportation	2.4
Wages of conductors	18.8
Wages of motormen	18.6
Wages of other car-service employees	2.1
Wages of car-house employees	2.2
Car service supplies	0.9
Miscellaneous car-service expenses	1.8
Cleaning and sanding track	0.4
Removal of snow and ice	0.6
Miscellaneous expenses, total	19.1
Salaries of general officers	1.1
Salaries of clerks	1.4
Printing and stationery	0.8
Miscellaneous office expenses	0.4
Storeroom expenses	0.2
Stable expenses	1.4
Advertising and attractions	0.1
Miscellaneous general expenses	1.8
Damages	7.8
Legal expense in connection with damages	2.3
Other legal expenses	0.7
Rent of land and buildings	0.3
Rent of track and terminals	0.6
Insurance	1.2

A comparison of the distribution of expenses for these companies with that for all companies reveals a number of points of difference which are significant.

IV.

ANALYSIS OF INTEREST AND DIVIDENDS.

Detailed analysis for all companies.—Table 93 shows for each street railway company the rate and amount of dividends declared during the census year upon its common or preferred stock or both, and the rate of interest on its funded debt. The table also shows the total dividends by states. The amount of interest accrued is shown by states in Tables 38 and 39. The data for the United States are summarized in Table 58, both operating and lessor companies being included.

TABLE 58.—Interest and dividends of operating and lessor companies combined: 1902.¹

Number of companies.....	957
Funded debt, total amount ²	\$992,709,139
Interest accrued on funded debt.....	\$43,578,961
Ratio of interest to funded debt, percentage.....	4.5
Preferred stock, amount.....	\$127,930,179
Number of companies having preferred stock.....	85
Number of companies declaring dividends on preferred stock.....	40
Dividends declared on preferred stock.....	\$4,301,284
Ratio of dividends to total preferred stock, percentage.....	3.47
Amount of preferred stock on which dividends were declared.....	\$83,869,065
Ratio of dividend-bearing preferred stock to total preferred stock, percentage.....	67.7
Ratio of dividends to dividend-bearing preferred stock, percentage.....	5.1
Common stock, amount.....	\$1,187,642,781
Number of companies declaring dividends on common stock.....	258
Dividends declared on common stock.....	\$28,787,887
Ratio of dividends to total common stock, percentage.....	2.46
Amount of common stock on which dividends were declared.....	\$560,326,121
Ratio of dividend-bearing common stock to total common stock, percentage.....	47.9
Ratio of dividends to dividend-bearing common stock, percentage.....	5.1
Both classes of stock, amount.....	\$1,315,572,960
Total number of companies declaring dividends.....	286
Total dividends declared.....	\$33,039,171
Ratio of total dividends to total capital stock, percentage.....	2.6
Total amount of stock on which dividends were declared.....	\$644,195,176
Ratio of dividend-bearing stock to total capital stock, percentage.....	49.8
Ratio of total dividends to total dividend-bearing stock, percentage.....	5.1

¹ Exclusive of 30 companies which failed to furnish this information and which issued \$17,325,000 bonds, \$4,000,000 preferred stock, and \$18,937,745 common stock.

² The amount of funded debt, interest on which was charged to the income account, is not reported, but is equal to nearly the total amount.

The amount of interest accrued on funded debt and charged to the income account during the census year was \$43,578,961, which was equal to a rate of 4.5 per cent on the outstanding funded debt. An examination of the rates of interest for individual companies, stated in Table 93, shows that by far the most common rate is 5 per cent. Many of the more recent bond issues, however, and especially those of the largest companies, have been placed at 4.5 per cent, or even at 4 per cent. A large number of companies still have bonds bearing 6 per cent interest, and a few 7 per cent, most of these bonds having been issued at a comparatively early period. The average ratio of interest accrued to the total funded debt, as shown in Table 58, is slightly lower than it would have been had not a few companies in bankruptcy failed to charge interest in the income account, and had not several other companies, very recently completed, charged interest for the census year to the cost of construction rather than to income. As shown elsewhere, however, the amount of interest accrued on funded debt somewhat exceeds the amount actually paid. (See page 56.)

For all street and interurban railways the ratio of total dividends declared to total capital stock is decidedly low—only 2.6 per cent in 1902. Less than one-third of the companies declared any dividends whatever during the census year, and these paid dividends on a little less than one-half of the total outstanding stocks. Even of companies having preferred stock, less than half were able to pay dividends at all, and they paid on about two-thirds of the total amount of such stock for all companies. In judging the significance of these figures, however, the possibility that the companies as a whole may be overcapitalized must be borne in mind.

The dividends of operating street and interurban railway companies represent a smaller percentage of their capitalization than the dividends of lessor companies. The dividends declared by operating companies, which amounted to \$15,882,110 in 1902, were equal to 2.1 per cent of the total stock of such companies (\$761,705,842) and to 4.6 per cent of their stock that paid dividends (\$348,796,456). For lessor companies the dividends average 3.2 per cent of the total capital stock (\$530,929,373) and 5.8 per cent of the dividend-bearing stock (\$295,398,872). This difference between operating and lessor companies is due to the fact that a considerable part of the most profitable railway trackage, lying in large cities, is held under lease, and that the rentals, which constitute the dividends of the lessor companies, are usually, and naturally enough, fixed so as to absorb nearly the full earning capacity of the leased system at the time when it is taken over by the operating company. When, therefore, as often happens, the operating company has little or no property except what it leases, the additional securities which it may issue must rest chiefly on the anticipation of future increase in earnings, and as a large proportion of the street railway leases have been effected very recently, comparatively little net profit is left at present in such cases for the operating companies.

Interest and dividends of companies, classified according to population.—Table 59 shows in condensed form the interest accrued and dividends declared by street and interurban railway companies in the various urban and interurban groups. The statistics are for both operating and lessor companies considered as one system.

TABLE 59.—INTEREST AND DIVIDENDS OF OPERATING AND LESSOR COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.			INTERURBAN RAILWAYS.		
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	957	138	56	99	314	60	290
Interest accrued.....	\$43,578,961	\$21,460,962	\$8,366,503	\$3,598,997	\$1,732,822	\$2,598,438	\$5,821,239
Ratio of interest to funded debt, percentage.....	4.5	4.4	5.0	4.6	4.5	3.8	4.3
Number of companies having preferred stock.....	85	11	9	17	16	11	21
Number of companies declaring dividends on preferred stock.....	40	7	7	9	3	7	7
Number of companies declaring dividends on common stock.....	258	80	27	37	37	8	69
Total number of companies declaring dividends.....	286	82	31	45	40	14	74
Total dividends declared.....	\$33,039,171	\$20,958,959	\$7,344,007	\$1,650,123	\$311,575	\$315,224	\$2,459,283
Ratio of dividends to capital stock, percentage.....	2.6	3.1	3.1	1.5	0.6	0.4	1.7
Amount of stock on which dividends were declared.....	\$644,195,176	\$370,763,110	\$168,513,240	\$35,137,910	\$6,536,410	\$9,401,975	\$53,842,531
Ratio of dividend-bearing stock to total stock, percentage.....	49.8	54.9	71.4	32.6	13.4	12.0	36.9
Ratio of dividends to dividend-bearing stock, percentage.....	5.1	5.7	4.4	4.7	4.8	3.4	4.6

¹ Exclusive of reports for 30 companies which failed to furnish this information.

The rate of interest is highest in urban centers of from 100,000 to 500,000 population, and does not differ materially among the other three urban groups. The fact that the average rate of interest on funded debt of interurban railways of both classes is lower than on urban railways is due in part to the modern origin of interurban companies, most of them having been organized since the fall in the prevailing rate of interest on securities generally. But it is also due in part to the fact that several new companies in this group charged interest during the census year to cost of construction and equipment.

As might be expected, street railways in cities of more than 100,000 population declared dividends on a much larger proportion of their stock, and showed a higher ratio of dividends to total capital stock, than those in smaller cities or than interurban lines. The average ratio of dividends to total capital stock was 3.1 per cent in each of the first two groups; but as a larger proportion of stock declared dividends in urban centers of the second group than in those of the first, the average rate of dividends on stock that bore dividends was lower in the second group of cities.

In none of the other four groups did the ratio of dividends to total capital stock rise even to 2 per cent, and in none of them, except the "other" interurban group, did more than one-third of the capital stock bear dividends. The ratio of dividends to the capital stock that bore dividends was lowest in the case of the fast, long interurban lines, and highest in the case of companies in urban centers of the first group. The differences in these ratios may not, and probably do not, correctly represent the differences in actual profitability of the several classes of railways, since the street railway companies in smaller towns and the interurban railways are probably somewhat more conservatively capitalized than those in the largest urban centers. In the case of many of the newer companies the absence of dividends is due to their policy of putting surplus earnings into improvements and extensions. It is true, however, beyond question, that in the smaller towns and rural districts a large number of railways have been established which must look to the future for any possible dividends on their stock.

Dividends of leading individual companies.—An examination of the statistics of dividends for individual companies in Table 93 reveals the widest differences even among railways operating under roughly similar conditions of traffic. These differences are partly due to the variations in the absolute earning capacity of the companies, but they are also partly due to other factors, such as the varying proportion of total capital represented by funded debt, the varying proportion of the income of operating companies going as rental to lessor companies, and the varying proportion between capitalization and actual cash investment. Many companies in the large cities, and even some of the most impor-

tant ones, declare no dividends, but usually an explanation of that fact may be found in some of the circumstances just mentioned. Thus the United Railways and Electric Company of Baltimore, Md., which paid no dividends in 1902, has a funded debt of three and one-third times the amount of its stock. The Brooklyn Rapid Transit Company, of New York, which paid no dividends, not only has a funded debt considerably greater than its stock, but, in addition, paid 10 per cent from its earnings on \$12,000,000 of the stock of a lessor company, a fact which is significant because, as previously suggested, the capitalization of an operating company which holds most of its trackage under lease is often based chiefly on expectation of future earnings. Indeed in several instances—e. g., the Interurban Street Railway Company of New York, and the Pittsburg Railways Company, of Pittsburg, Pa.—the operating companies have a very small amount of capital stock as compared with the lessor companies which they control. Among other important companies which declared no dividends in 1902 may be mentioned the Third Avenue Railroad Company, of New York, which has a funded debt nearly three times as great as its stock; the Chicago Union Traction Company, of Chicago, Ill., and the Union Traction Company, of Philadelphia, Pa., both of which have exceedingly heavy rental payments; and the leading operating companies in St. Louis, Mo., Milwaukee, Wis., and Indianapolis, Ind., which also have heavy fixed charges.

Of the \$15,882,110 of dividends declared by all operating companies, \$11,667,726, or 73.5 per cent, was paid by 22 large companies, each of which declared dividends of \$200,000 or more. The rates of dividends of these 22 companies were as follows: The United Railroads of San Francisco, Cal., declared 2.25 per cent on its one class of stock. The Capital Traction Company, of Washington, D. C., the South Side Elevated Railway Company, of Chicago, Ill., the Detroit United Railways Company, of Detroit, Mich., the Louisville Railway Company, of Louisville, Ky., the Twin City Rapid Transit Company, of St. Paul and Minneapolis, Minn., the Manhattan Railway Company, of New York city, the Omaha Street Railway Company, of Omaha, Nebr., and the Cleveland Electric Railway Company, of Cleveland, Ohio, each declared dividends of 4 per cent on its common stock. Of these companies, the Twin City Rapid Transit Company and the Louisville Railway Company also reported preferred stock, the former declaring a dividend of 7 per cent and the latter 5 per cent on such stock. The Wilkesbarre and Wyoming Valley Railway Company, of Wilkesbarre, Pa., declared 4.25 per cent, and the International Railway Company, of Buffalo, N. Y., 4.8 per cent on the single class of stock issued. The rate of dividends was 5 per cent in the case of the Old Colony Railway Company, of eastern Massachusetts, the Metropolitan Street Railway Company, of Kansas City, Mo., the United Traction Company, of Albany

and Troy, N. Y., and the Cleveland City Railway Company, of Cleveland, Ohio, none of which reported preferred stock. The Boston and Northern Street Railway Company, of eastern Massachusetts, and the Boston Elevated Railway Company, of Boston, each declared 6 per cent; the Union Street Railway Company, of Providence, R. I., 8 per cent; the Chicago City Railway Company, of Chicago, 9 per cent; and the Coney Island and Brooklyn Railroad Company, 16 per cent, all of these companies having a single class of stock only. The Metropolitan West Side Elevated Railway Company, of Chicago, declared 3 per cent, and the Milwaukee Electric Railway and Light Company, of Milwaukee, 6 per cent on their preferred stock, but paid nothing on their common stock.

Dividends, by states.—An examination of the statistics in Table 93 will show wide differences in the ratio of dividends to capital stock among the states. One of the conspicuous features of the table is the relatively high average rate paid by Massachusetts companies, as compared with those in other leading states. The dividends on common stock in Massachusetts averaged 5 per cent for operating and lessor companies together, and while only 27 out of 75 operating companies declared dividends, these comprised most of the large companies. The one company in this state which had preferred stock, a lessor company, declared an 8 per cent dividend. In New York state, on the other hand, only 9 of the 96 operating companies declared dividends on common stock, and the average rate on the common stocks of operating and lessor companies combined was only 2.5 per cent. The amount of preferred stock in the state was small and the average rate of dividends on such stock very low. In Pennsylvania only 18 of

the 98 operating companies declared dividends on their common stock; and the average rate of dividends for operating and lessor companies was 3.8 per cent on common stock and 4.8 per cent on preferred stock, which was about one-tenth as much in amount as the common. In nine states and territories, most important among which are Indiana and Tennessee, no companies declared dividends on common stock. The only states in which the average rate of dividends on common stock exceeded 2 per cent are Colorado, District of Columbia, Florida, Illinois, Kentucky, Massachusetts, Minnesota, Nebraska, New York, Ohio, Pennsylvania, and Rhode Island.

V.

GENERAL RESULTS OF OPERATION.

In many respects the most interesting information relating to the street railway industry is that which shows the relation of traffic, receipts, and expenditures. Statistics of this character may be regarded as presenting the general results of street railway operation.

General results of operation of companies, classified according to power.—Table 60 presents, for all street railways of the United States and for groups of companies classified according to the power used, the percentage which operating expenses bear to operating earnings, or "operating ratio;" the amount of operating earnings per mile of track and per car mile, respectively; the total operating expenses per car mile, together with the expenses per car mile for power plant and for operation of cars; the amount of operating expenses per fare passenger; the amount of passenger earnings per fare passenger; and the net earnings per mile of track.

TABLE 60.—GENERAL RESULTS OF OPERATION, ALL COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric elevated.	Cable, surface, and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time only.				
Number of companies.....	799	556	112	57	52	5	14	3
Ratio of operating expenses to earnings, percentage.....	57.49	57.94	58.11	58.14	73.02	49.71	53.97	122.65
Operating earnings per mile of track constructed.....	\$11,152	\$11,045	\$9,978	\$2,978	\$9,454	\$71,889	\$80,937	\$1,314
Operating earnings per car mile.....	0.2187	0.2168	0.2597	0.1901	0.2603	0.1960	0.3258	0.1464
Operating expenses per car mile, total.....	0.1257	0.1256	0.1509	0.1105	0.1901	0.0975	0.1758	0.1795
Power plant.....	0.0204	0.0193	0.0293	0.0250	.....	0.0232	0.0345	0.0224
Operation of cars.....	0.0552	0.0567	0.0478	0.0410	0.0784	0.0448	0.0445	0.0552
Operating expenses per fare passenger.....	0.0301	0.0294	0.0420	0.0381	0.0321	0.0259	0.0285	0.1144
Passenger earnings per fare passenger.....	0.0494	0.0493	0.0493	0.0621	0.0432	0.0508	0.0488	0.0458
Net earnings per mile of track.....	4,741	4,646	3,761	1,247	2,550	36,151	14,241	² 298

¹ Exclusive of reports for 18 companies which failed to furnish this information.

² Deficit.

Attention should be called at the outset to the fact that several of the items in this table for electric railway companies operating commercial lighting plants can not properly be compared with similar items in the other columns, since the total operating expenses and earnings, including those for the lighting business, enter into the computation. A fairly correct idea of the earnings of such companies from the railway busi-

ness alone may be obtained from the income account by omitting therefrom the income from the sale of current for light and power, although the resulting figures are not quite comparable with those of electric railway companies which do not operate commercial lighting plants, since they also derive a small incidental revenue from the sale of current. With the deduction indicated, companies with commercial lighting plants had

operating earnings of \$6,358 per mile of track and 18.39 cents per car mile. Instead, therefore, of having earnings greater per car mile than companies without commercial lighting plants, as the crude figures might imply, they really had railway earnings considerably less per car mile, as might be expected in view of the fact that most of these companies are in the smaller towns. For purposes of rough calculation and comparison it may be assumed that the operating expenses of companies having lighting plants are divided between the railway business and the lighting business in the same proportion in which the earnings are divided. On this assumption the "railway" operating expenses of such companies would be 10.69 cents per car mile and 2.97 cents per passenger. The expense per car mile would thus appear somewhat less than for companies without lighting plants, and such a showing may be accounted for, at least in part, by the fact that the companies with lighting plants, operating in the small towns, have smaller cars and pay lower wages than do companies of the other group. Their operating expenses per passenger, on the other hand, are apparently somewhat greater for the companies with lighting plants.

There is, of course, no one standard by which to judge the success of railway operations. Street railway men themselves, in considering the question, are perhaps most likely to base their conclusions on the percentage which operating expenses bear to operating earnings—the operating ratio, as it is called. Generally speaking, a low ratio of expenses to earnings is regarded as an indication of good management. This, however, is not always the case. It is quite conceivable that a company would be able to earn a higher return on its investment by increasing the amount of its traffic, through a lessening of fares or otherwise, even though the percentage of operating expenses to earnings should be slightly raised as a result. Again, a low ratio of operating expenses to earnings may mean merely that the fares are higher or the service less satisfactory than elsewhere, rather than that the company is peculiarly economical in its operating methods. Conversely, where fares are low the ratio of operating expenses to earnings may be high, while the cost of operation per car mile or per passenger is exceptionally low. Given cars of similar size and character and given similar general conditions of operation, the truest test of the success of railway operations is in the amount of expenses per car mile operated and per passenger carried. Finally, it may be noted that a low ratio of operating expenses to operating earnings is often made possible only by heavy capital investment. Indeed, it is sometimes the case that costly improvements, which materially lessen the expenses of transportation, are not strictly profitable from the standpoint of the investor.

As appears from Table 60, the operating expenses of

all street and interurban railway companies in the census year 1902 amounted to 57.5 per cent of their operating earnings. The gross earnings, including those from sale of current and other sources, were equal to \$11,152 per mile of track, and to 21.87 cents per mile run by cars of all classes. The passenger earnings per passenger car mile, not shown in the table, averaged 21.14 cents. The average fare, obtained by dividing the passenger earnings by the number of fare passengers, was 4.94 cents, and the total operating expenses per fare passenger—which slightly exceed the expenses properly chargeable to passenger traffic—were 3.01 cents. The average net earnings per mile of track for all companies were \$4,741. The ratio of operating expenses to operating earnings is much lower on the street and electric railways of the country as a whole than on the steam railways, which spent 64.7 per cent of their earnings for operation in the year ending June 30, 1902, and in the previous year 64.9 per cent.¹ It is possible that the comparison thus made is not altogether a just one, since 41.4 per cent of their expenses was incurred by steam railways in 1902 for the maintenance of ways and structures, while street and interurban railway companies assigned to maintenance of ways and structures only 8.5 per cent of their operating expenses.² Beyond question it costs relatively less to maintain a street railway than a steam railway, since the former has much less track to keep up in proportion to the amount of its earnings. Moreover, the speed of electric cars is less than that of steam trains, and the wear and tear, as well as the injury to property from accident, is therefore less on electric than on steam railways. Again, the roadbed and equipment of most of the electric railways are comparatively new, and they may therefore require less repair and renewal at present than will be necessary later on.³

However this may be, it is probable that, with all possible allowances for the difference in conditions and policy with respect to expenditures for maintenance, the proportion of operating expenses to earnings would still be found lower on street and electric railways than on steam railways. Such a difference might be attributable to relatively higher charges for transportation on the electric lines. On the other hand, it is to be remembered that a relatively low operating ratio might be secured at the expense of a relatively heavy capital investment. Now the amount of capital liabilities is decidedly greater in proportion to the operating earnings in the case of street railways than in the case of steam railways. In the absence, however, of definite knowledge as to the actual cash investment in either class of railways, it is impossible to

¹ Report of Interstate Commerce Commission on Statistics of Railways, 1902, page 91.

² Ibid., page 81.

³ For a discussion of the subject of allowances for depreciation and renewal, see page 57.

decide to what extent the lower ratio of operating expenses to earnings on electric lines may actually be due to the heavier investment of capital.

For the purpose of further considering the ratio of expenses to earnings for the different classes of railways, the averages shown in Table 60 have been supplemented by the following table, showing the number of companies which have operating ratios falling within specified limits. In studying this table the differences in the importance of the individual companies should be borne in mind.

TABLE 61.—Distribution of railway companies in the several groups, classified according to power, with respect to their operating ratio: 1902.¹

PERCENTAGE OF OPERATING, EX- PENSES TO EARN- INGS.	NUMBER OF COMPANIES.							
	Total.	Electric surface.		Part time.	Animal.	Steam and elec- tric ele- vated.	Cable, sur- face, and in- clined planes	Steam surface.
		With- out com- mer- cial light- ing.	With com- mer- cial light- ing.					
Total	799	556	112	57	52	5	14	3
Under 50	73	43	12	9	3	1	5	
50 but under 60.	169	120	29	7	7	3	3	
60 but under 70.	216	159	33	14	7	1	2	
70 but under 80.	121	90	18	3	8		2	
80 but under 90.	92	64	13	7	6		1	1
90 and over	128	80	7	17	21		1	2

¹ Exclusive of reports for 18 companies which failed to furnish this information.

Electric surface railways without commercial lighting plants, the most important class, show an average operating ratio of 57.9 per cent. It is seen in Table 61 that 43 of the 556 companies of this class devote less than 50 per cent of their earnings to operating expenses, while on the other hand 80 such companies devote more than 90 per cent of their earnings to expenses. The largest group is that of companies that have an operating ratio of between 60 and 70 per cent, but they operate much less track than companies with a ratio of from 50 to 60 per cent.

That a considerable degree of economy is secured by combining light and power plants with railways in towns of smaller population may probably be deduced from the fact that the average operating ratio for companies having commercial lighting plants—58.1 per cent—was practically the same as that for electric companies without such plants, in spite of the fact that the former are for the most part situated in towns of moderate size where the railway traffic is comparatively small. The operating ratio for companies with lighting plants is indeed considerably lower than that for those without such plants in cities of corresponding size, for it will be noted that much more than half of the business of companies of this group is done in places of less than 100,000 inhabitants; and, as appears in Table 63, the operating ratio for full-time companies without lighting plants in towns of less than 25,000

inhabitants is 68.8 per cent, and in urban centers of from 25,000 to 100,000 inhabitants 61 per cent.

The lowest operating ratio, 49.7 per cent, was that of elevated railways. As only one of the five companies had an operating ratio below 50 per cent, while three reported ratios between 50 and 60 per cent, and the fifth reported a ratio between 60 and 70 per cent, the great inequality in the relative importance of the companies is quite evident.

The explanation of the low average operating ratio for elevated railways is to be found in the fact that the operating earnings per passenger were slightly higher than for electric surface railways without lighting plants, while the operating expenses per car mile were about 20 per cent lower. It is, however, impossible to draw from these statistics any satisfactory conclusion regarding the conditions of operation on elevated railways at the present time, because a large part of the traffic of the most important company during the census year was handled by steam power, while since that time steam has been replaced by electricity. The fact that in 1902 the power plant expenses of elevated railways were 2.3 cents per car mile, as compared with only 1.9 cents for electric surface railways without lighting plants, was undoubtedly due chiefly to the higher cost of steam traction, though it was probably also due in some measure to the larger cars and higher speed on elevated railways. On the other hand, large cars and high speed tend to reduce the expenses of running cars, particularly the important item of wages of motormen, or engineers, and gatemen. The practice of running cars in trains also reduces wages of motormen or engineers per car mile, and this saving is not wholly offset by the expenses of maintaining ticket sellers and ticket "choppers" at the stations.

Some idea of the financial advantage of electric traction on elevated railways as compared with steam traction may be gained from a comparison of the annual reports of the Manhattan Elevated Railway Company for the two years ending September 30, 1901 and 1903, respectively. In 1901, when steam was used almost exclusively, the operating ratio was 55.4 per cent; in 1903, when electric power was almost the sole means of traction, the ratio was only 42.9 per cent. The operating expense of this company per passenger was 2.72 cents in 1901 and only 2.12 cents in 1903. The operation of 6-car trains instead of 5-car trains, which was made possible by electricity, contributed materially to this reduction in operating expenses.

Cable and inclined plane railways likewise show a conspicuously low operating ratio. Five of the 14 companies reported a ratio below 50 per cent, and 8 reported a ratio below 60 per cent. The 3 ordinary cable railways show an average operating ratio of 54.7 per cent. The fact that these ordinary cable railways are all in a large city and have very dense traffic makes their results more favorable than would be the case if the conditions

under which they operate were similar to those of the average electric railway. Under similar conditions of traffic electric traction is cheaper than cable traction in the matter of current expenses, to say nothing of the fact that the capital investment per mile in an overhead trolley electric railway is much less than in a cable system. In 1890, when the number of cable railways was considerably greater than at the present time, the operating expenses of such companies, as they were reported for the Eleventh Census, were 65.7 per cent of their operating earnings. The high earnings and high expenses per car mile for the inclined planes are explained by their short tracks, dense traffic, and relatively large capital investment per mile of track.

Animal power railways, as might be expected, present a much less favorable operating ratio, 73.0 per cent, than most other classes shown. Of the 52 companies of this class, 21 report operating expenses exceeding 90 per cent of operating earnings. On the other hand, 10 companies show operating ratios under 60 per cent. The explanation of the high average ratio is found partly in the fact that the average earnings per passenger are lower for animal power railways than for those of any other class, but the explanation lies chiefly in the heavy expense of operation, which amounts to no less than 19 cents per car mile. While the group of animal power railways includes a large number of companies in small towns, where the traffic is very light, the greater part of the earnings and expenses fall to the four companies in New York city, which have very dense traffic; and the averages for the group as a whole are therefore largely determined by the figures for these four companies. When it is remembered that the horse cars are much smaller than the electric cars, the enormous reduction in expenses which has resulted from the introduction of electricity may be appreciated by comparing the operating expenses per car mile for animal power roads with those for electric railways without lighting plants, 12.56 cents.

Effect of change to electric traction on cost of operation.—Interesting conclusions might be drawn from the detailed statistics of leading railway systems, showing the reduction in operating expenses which followed the introduction of electric power. Comparable figures are, however, very difficult to obtain because of changes in the ownership of railways and because of the extension of the old lines. Consolidation of formerly independent lines very often accompanied the change of power, and where this has been the case it is not only hard to obtain comparable statistics, but it is also impossible to distinguish economies due to change of power from those due to consolidation.

The "electrification" of the street railway lines of Philadelphia took place about 1894, much the greater part of the trackage before that time having been operated by animal power. In 1893 the operating expenses of all the lines of the city, \$5,322,734, were

63.1 per cent of the operating earnings. In 1895 the ratio fell to 59.7 per cent; in 1896 to 52.5 per cent; and in 1898 to 41 per cent. In the last-named year the expenses were only \$4,608,163, or more than 10 per cent less than in 1893, while earnings had increased one-third. Combination also contributed to the economy in Philadelphia.¹

Another example of the economy of electric traction may be taken from the West End Street Railway Company of Boston, now controlled by the Boston Elevated Railway Company. In the year ending September 30, 1889, this company was just beginning to install electric traction. Its earnings were \$5,204,512; its operating expenses, exclusive of taxes and rentals, \$4,098,533, the operating ratio being 78.7 per cent. The conversion to electric traction had largely been accomplished by the end of 1894, nearly three-fourths of the track being then operated exclusively by electricity. For that year the operating earnings were \$6,823,879; the expenses \$4,805,605; the operating ratio 70.4 per cent. The marked increase in traffic indicated by the figures of earnings was in considerable measure attributable to improvement in the service, as there had been comparatively little addition to the trackage of the company.²

The Third Avenue Railroad Company of New York had precisely the same length of track (directly operated) ten years ago that it has to-day. In the year ending June 30, 1892, its main line was operated by animal power, although it had two shorter branches with cable traction. In that year the earnings were \$1,741,072; the operating expenses \$1,184,804; the operating ratio 68 per cent. The traffic was very dense, and there were probably fewer long-distance passengers in 1902. Under cable traction, which was introduced in 1894, the expenses were materially reduced in proportion to the traffic. Apparently a still further reduction has been accomplished by the recent change to electricity. It is impossible to speak with certainty, because the financial difficulties of the Third Avenue Railroad and its transfer to the Metropolitan Street Railway Company have made satisfactory comparison of the cost of operation in recent years impracticable. According to the report of the company for the year ending June 30, 1901, the operating expenses for a greatly increased traffic were less than in 1892, and the operating ratio was only 49.6 per cent. In 1902 there were heavy expenditures for maintenance and for damages, but the operating ratio rose only to 61.3 per cent, which was still decidedly lower than the ratio under horse traction.³

General results of operation of companies classified according to population.—The results of the operations

¹ Compiled from Street Railway Investor's Guide.

² Compiled from Reports of Massachusetts Railroad Commissioners, 1889 and 1894.

³ Compiled from the Reports of the New York Railroad Commissioners, 1892, 1899, 1902.

of street railways classified according to population of urban centers served, and of the two classes of interurban railways, are summarized in Table 62, which includes the same items as were presented in the corresponding table for companies classified according to

power. More instructive is Table 63, which presents similar data for full-time electric surface railways without commercial lighting plants. The following discussion is based chiefly upon the data presented in Table 62.

TABLE 62.—GENERAL RESULTS OF OPERATION OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	799	65	47	83	312	53	239
Ratio of operating expenses to earnings, percentage.....	57.49	55.69	53.54	59.31	68.09	59.80	64.83
Operating earnings per mile of track constructed.....	\$11,162	\$24,360	\$14,329	\$8,009	\$5,440	\$3,678	\$5,253
Operating earnings per car mile.....	0.2187	0.2318	0.2119	0.2086	0.1891	0.2197	0.2075
Operating expenses per car mile, total.....	0.1257	0.1291	0.1134	0.1207	0.1287	0.1314	0.1345
Power plant.....	0.0204	0.0185	0.0160	0.0195	0.0316	0.0289	0.0272
Operation of cars.....	0.0552	0.0597	0.0544	0.0494	0.0437	0.0446	0.0538
Operating expenses per fare passenger.....	0.0301	0.0274	0.0275	0.0323	0.0422	0.0547	0.0355
Passenger earnings per fare passenger.....	0.0494	0.0482	0.0493	0.0478	0.0483	0.0809	0.0504
Net earnings per mile of track.....	4,741	10,793	6,658	3,259	1,736	1,477	1,847

¹ Exclusive of reports for 18 companies which failed to furnish this information.

TABLE 63.—GENERAL RESULTS OF OPERATION OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	556	47	38	66	165	40	200
Ratio of operating expenses to earnings, percentage.....	57.94	56.45	54.14	60.99	68.81	59.94	65.83
Operating earnings per mile of track constructed.....	\$11,045	\$21,982	\$14,021	\$7,348	\$4,872	\$3,533	\$5,261
Operating earnings per car mile.....	0.2168	0.2376	0.2064	0.1865	0.1662	0.2115	0.2008
Operating expenses per car mile, total.....	0.1256	0.1342	0.1118	0.1138	0.1144	0.1267	0.1312
Power plant.....	0.0193	0.0177	0.0157	0.0185	0.0260	0.0286	0.0270
Operation of cars.....	0.0667	0.0622	0.0542	0.0504	0.0469	0.0431	0.0535
Operating expenses per fare passenger.....	0.0294	0.0276	0.0274	0.0307	0.0361	0.0555	0.0342
Passenger earnings per fare passenger.....	0.0493	0.0479	0.0494	0.0485	0.0483	0.0845	0.0496
Net earnings per mile of track.....	4,646	9,572	6,429	2,866	1,519	1,415	1,824

¹ Exclusive of reports for 16 companies which failed to furnish this information.

The great advantage which the street railways in the large cities have over those in smaller towns is conspicuous in the above tables. The amount of earnings per mile of track for electric surface lines having no lighting plants, which in urban centers of more than 500,000 inhabitants is \$21,982, decreases steadily with decreasing population of the centers served, an average of only \$4,872 per mile of track being shown for companies in centers of less than 25,000 inhabitants. The amount of net earnings per mile of track decreases even more sharply, being \$9,572 for electric railways without lighting plants in urban centers of the first group and only \$1,519 in centers of smallest population.

The differences among the groups in the ratio of operating expenses to operating earnings are also marked. In urban centers of more than 500,000 inhabitants railways of all classes combined spent for operation only 55.7 per cent of their operating earnings, and the electric surface railways not furnishing commercial lighting in such centers show a ratio of expenses to earnings only slightly higher. In urban centers of from

100,000 to 500,000 inhabitants the operating ratio is even lower than in the largest cities. On the other hand, in places of from 25,000 to 100,000 inhabitants the operating expenses amounted to 59.3 per cent of operating earnings for all companies combined, and to 60.99 per cent for electric surface companies without commercial lighting plants. In centers of less than 25,000 inhabitants the corresponding operating ratios are 68.1 per cent and 68.8 per cent, respectively. The fast, long interurban railways present quite favorable operating results. The other group of interurban railways on the other hand, including many railways that closely resemble the railways in the smallest towns, spent 64.8 per cent of their earnings for operation.

The differences among the various population groups as regards the ratio of operating expenses to earnings are further indicated in Tables 64 and 65, which show for all railways, and for electric surface railways without commercial lighting plants, respectively, the number of companies falling within stated limits of operating ratios.

TABLE 64.—*Distribution of railway companies in the several urban and interurban groups, according to their operating ratios: 1902.*¹

PERCENTAGE OF OPERATING EXPENSES TO OPERATING EARNINGS.	NUMBER OF COMPANIES.						
	Total.	Urban centers, population.				Interurban railways.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Total	799	65	47	83	312	53	239
Under 50	73	9	10	8	16	8	22
50 but under 60	169	16	23	28	48	15	39
60 but under 70	216	14	6	31	84	17	64
70 but under 80	121	12	5	12	49	7	36
80 but under 90	92	5	—	1	47	2	37
90 and over	128	9	3	3	68	4	41

¹ Exclusive of reports for 18 companies which failed to furnish this information.**TABLE 65.**—*Distribution of full-time electric surface railway companies, without commercial lighting, in the several urban and interurban groups, according to their operating ratios: 1902.*¹

PERCENTAGE OF OPERATING EXPENSES TO OPERATING EARNINGS.	NUMBER OF COMPANIES.						
	Total.	Urban centers, population.				Interurban railways.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Total	556	47	38	66	165	40	200
Under 50	43	5	6	4	6	6	16
50 but under 60	120	9	21	20	27	11	32
60 but under 70	159	11	6	27	48	12	55
70 but under 80	90	10	3	11	27	6	33
80 but under 90	64	4	—	1	27	2	30
90 and over	80	8	2	3	30	3	34

¹ Exclusive of reports for 16 companies which failed to furnish this information.

It will be observed from Table 65 that in urban centers of more than 500,000 inhabitants only 5 out of the 47 electric surface railways without commercial lighting plants had operating ratios under 50 per cent. Four of these 5 companies, however, operate great railway systems, and the 5 companies together control an aggregate trackage of 1,289.02 miles, which is 27.5 per cent of the total of 4,680.96 miles reported for all electric surface railways in centers of this size. Of the 9 companies in urban centers of more than 500,000 inhabitants that show an operating ratio of from 50 to 60 per cent, 3 have more than 300 miles of track each, and 2 others operate large systems. The total trackage of the 14 companies that show operating ratios under 60 per cent is 2,641.45 miles, or 56.4 per cent of the total trackage for centers having more than 500,000 inhabitants. On the other hand, most of the 22 electric railway companies in the largest centers that show an operating ratio over 70 per cent are small concerns in the outskirts and

suburbs. The average operating ratio for the group thus represents pretty closely the conditions for the more important street railway systems of the great centers.

In urban centers of from 100,000 to 500,000 inhabitants 21 of the 38 electric surface railway companies not furnishing commercial lighting reported operating expenses between 50 and 60 per cent of earnings, and 6 companies, with 630.17 miles of track out of a total of 3,251.54 miles for the group, reported a ratio under 50 per cent. Only 5 companies in centers of this size had an operating ratio of 70 per cent or higher. This apparently more favorable distribution of companies in centers of the second rank, as compared with the largest centers, is largely explained by the fact that consolidation has gone so far in the second group that very few small railways, such as exist in some of the centers of the first group, now remain in operation.

In centers of from 25,000 to 100,000 inhabitants only a small proportion of the electric railway companies have an operating ratio of less than 50 per cent, while the largest group is that of companies whose expenses are between 60 and 70 per cent of their operating earnings.

Still less favorable were the conditions shown for the smallest centers, where only one-fifth of the electric railway companies reported an operating ratio under 60 per cent. The largest single group in such centers was that of companies with from 60 to 70 per cent; but more than half of the whole number of companies reported a ratio of 70 per cent or higher, and 30 out of the 165 companies spent more than 90 per cent of their earnings for operation.

The distribution of fast, long interurban railway companies without commercial lighting plants shows a rather wide variation in the proportion of expenses to earnings. Twenty-three of the 40 companies have an operating ratio between 50 and 70 per cent. Of the other interurban railways, almost exactly one-half had an operating ratio of 70 per cent or higher, though the largest single group of companies reported from 60 to 70 per cent.

Relation of operating ratio to density of traffic.—Table 66 classifies full-time electric surface railway companies without commercial lighting according to the number of fare passengers per mile of track and the ratio of operating expenses to operating receipts. The fast, long interurban railways are omitted from the table because the number of fare passengers on such railways can not properly be compared with those on other classes of electric railways. The table, however, includes those interurban railways that have been classed under the head of "other" in this report.

TABLE 66.—*Distribution of full-time electric surface railways, without commercial lighting, according to number of fare passengers carried per mile of track operated and according to operating ratio: 1902.*¹

NUMBER OF FARE PAS- SENGERS CARRIED PER MILE OF TRACK OPER- ATED.	NUMBER OF COMPANIES REPORTING OPERATING RATIO.						
	Total.	Under 50 per cent.	50 per cent but un- der 60 per cent.	60 per cent but un- der 70 per cent.	70 per cent but un- der 80 per cent.	80 per cent but un- der 90 per cent.	90 per cent and over.
Total	514	35	109	147	84	62	77
Under 25,000.....	54	5	3	7	12	6	21
25,000 but under 50,000 ..	72	2	8	14	10	14	24
50,000 but under 100,000 ..	177	6	30	53	32	33	23
100,000 but under 200,000 ..	145	9	45	52	23	8	8
200,000 but under 300,000 ..	34	6	11	11	6	.....	1
300,000 but under 400,000 ..	15	4	7	4	.....	.....	.....
400,000 and over	17	4	5	6	1	1	.....

¹ Exclusive of reports for 2 railways carrying freight only, for 16 which failed to furnish this information, and for 40 fast, long interurbans.

In judging these statistics the fact that companies differ materially in importance must be borne in mind. The table shows clearly that an increase in the density of traffic per mile of track is usually accompanied by a reduction of the ratio of operating expenses to earnings. This is due chiefly to the fact that heavy traffic per mile of track is usually accompanied by heavy traffic and earnings per car mile. Proceeding from the group showing the least number of passengers per mile of track to the group showing the greatest number, the number of companies having low operating ratios increases. Nearly two-fifths of the 54 companies reporting less than 25,000 passengers per mile of track showed a ratio of expenses to earnings of 90 per cent or higher, while only 5 had an operating ratio of less than 50 per cent. On the other hand, among the 15 companies reporting between 300,000 and 400,000 passengers per mile of track, there is none with an operating ratio exceeding 70 per cent, and only 4 have a ratio of 60 per cent or more. Similarly, of the 17 companies having more than 400,000 passengers per mile of track, 4 had an operating ratio of less than 50 per cent and 9 a ratio of less than 60 per cent, while only 2 showed a ratio of 70 per cent or higher.

Table 67 classifies full-time electric surface railways without commercial lighting plants, other than fast, long interurban lines, according to the number of passengers per car mile and the ratio of operating expenses to operating earnings.

The close connection between a high number of passengers per car mile and a low operating ratio appears clearly from this table. Of the 198 companies reporting less than 3 passengers per car mile, 88 show an operating ratio of 80 per cent or more, and only 30 had a ratio less than 60 per cent. On the other hand, of the 92 companies with from 4 to 5 passengers per car mile, only 8 present an operating ratio of 80 per cent or higher, and 35 reported a ratio under 60 per

cent. Of the 60 companies with 5 or more passengers per car mile, only 16 had an operating ratio of 70 per cent or more, while more than one-half show a ratio under 60 per cent, and one-sixth of them show a ratio less than 50 per cent.

TABLE 67.—*Distribution of full-time electric surface railways, without commercial lighting, according to number of fare passengers carried per car mile and according to operating ratio: 1902.*¹

NUMBER OF FARE PAS- SENGERS CARRIED PER CAR MILE.	NUMBER OF COMPANIES REPORTING OPERATING RATIO.						
	Total.	Under 50 per cent.	50 per cent but under 60 per cent.	60 per cent but under 70 per cent.	70 per cent but under 80 per cent.	80 per cent but under 90 per cent.	90 per cent and over.
Total	514	35	110	146	84	62	77
Under 2.....	64	4	4	8	10	8	30
2 but under 3.....	134	4	18	40	22	27	23
3 but under 4.....	164	5	43	54	29	19	14
4 but under 5.....	92	12	23	32	17	4	4
5 but under 6.....	38	6	18	6	3	2	3
6 but under 7.....	14	2	2	4	1	2	3
7 and over.....	8	2	2	2	2	.....	.....

¹ Exclusive of reports for 2 railways carrying freight only; for 16 which failed to furnish this information, and for 40 fast, long interurbans.

Causes affecting the operating ratio.—The causes which contribute to keep the operating ratio of street railways in large cities lower than in the smaller towns may be clearly discerned by a consideration of the other items in Tables 62 and 63. The difference is not due to higher fares in the great cities. It appears that the average fare collected per passenger on electric surface railways without lighting plants does not differ very materially as among the four urban groups, ranging from 4.79 cents to 4.94 cents. It is, however, largely the fact that the average passenger earnings per passenger are highest in urban centers of the second group, which makes the operating ratio for the companies of this group slightly lower than for those in the largest centers.

It is also clear that the low ratio of operating expenses in the first two groups of urban centers is not due to the low cost of operating cars. In fact, the average cost of operation per car mile for railways without lighting plants, 13.42 cents, is about one-seventh higher in centers of more than 500,000 inhabitants than in any of the other classes of urban centers; while the other three groups of urban centers differ very little among themselves in the amount of operating expenses per car mile. It is probable that the cars in the great cities average somewhat larger than those elsewhere, but they can scarcely exceed in size the cars in centers of from 100,000 to 500,000 inhabitants by as great a proportion as the expenses per car mile exceed those in the second group of centers.

One reason, perhaps the chief reason, why it costs more to operate cars in the largest cities than elsewhere

is found in the higher rates of wages. It is possible, too, that on account of the obstructions to traffic the average rate of speed of surface cars is less in large cities than elsewhere, so that a larger amount of wages must be paid to conductors and motormen for covering a given distance, even if time wages were not higher. The expense of "operating cars," which consists chiefly of the wages of conductors and motormen, amounts to 6.2 cents per car mile on electric surface railways without lighting plants in the largest centers as against 4.7 cents in centers of the smallest size. One might reasonably expect, however, that the large scale on which the street railway business is conducted in great cities would result in material economies with regard to the power plant; and as a matter of fact, as shown by Table 63, the power plant expenses per car mile in the greatest centers, though they slightly exceed those in centers of the second group, are less than in centers of from 25,000 to 100,000 inhabitants, and decidedly less than in the smallest centers.

Other causes having been excluded, the reason why the operating ratio is lower in the largest cities than elsewhere is necessarily found to lie in the great density of traffic per car mile. It will be recalled that the average number of passengers carried per car mile on electric surface railways without commercial lighting plants, in centers of more than 500,000 inhabitants, was 4.92 in 1902, while in the smallest centers it was only 3.26. The table at present under consideration shows that the operating earnings of electric surface companies without lighting plants amount to 23.76 cents per car mile in centers of more than 500,000 inhabitants, as compared with 20.64 cents in centers of the second group, and with only 16.62 cents in places of less than 25,000 inhabitants. Notwithstanding the fact that in all probability the rides taken by passengers in the greatest cities average longer than elsewhere, the cars in such cities are so much larger and so much better filled that they earn more for each mile traveled than in any of the other urban groups. The passengers who stand are those who make the greatest profit for the railway company.

The figures which show the average operating expenses per fare passenger on electric surface railways without lighting plants indicate the effects of these differences

in the density of traffic and in the amount of earnings per car mile. They range from 2.76 cents for the largest centers to 3.51 cents for the smallest. A fraction of the operating expenses represents the cost of other branches of service besides passenger traffic, but in the case of electric surface companies without lighting plants this fraction is so small as to be negligible.

The fact that the operating expenses of fast, long interurban railways, despite the decidedly larger size of their cars, are not materially greater per car mile than in those of the last three urban groups is attributable partly to the high rate of speed maintained, which reduces the outlay for conductors and motormen. The power plant expenses of such railways, on the other hand, as might be expected, are heavier per car mile than for any class of urban railways. The comparatively unfavorable operating results of other interurban lines are shown primarily in their high operating expenses per car mile. These companies also have low earnings per mile of track; but against this must be set the fact that the cost of construction and equipment per mile for many of these railways is much less than in the case of the railways in large cities. The finances of fast, long interurban railways are discussed in greater detail in Part I, Chapter VII.

VI.

BALANCE SHEET.

Detailed analysis for all companies.—Table 68 presents for the United States and for each state a summary of the balance sheets of both operating and lessor street railway companies. Besides the 18 companies mentioned on page 54, as reporting no financial statistics, it was found impossible to obtain balance sheets for the Denver, Lakewood and Golden Railroad Company, which has 6 miles of track, and for one lessor company, the Pittsburg and Charleroi Street Railway Company, which has 4.6 miles of track. Moreover, the data for the balance sheets of a number of other lessor companies had to be drawn from the reports of the controlling operating companies, from various financial reports and other sources, it being impossible to obtain returns directly from the companies, as some of them have virtually ceased to keep financial accounts.

STREET AND ELECTRIC RAILWAYS.

TABLE 68.—BALANCE SHEET FOR OPERATING

1	STATE OR TERRITORY.	Number of companies.	ASSETS.								Net deficit for states showing deficit.
			Total.	Cost of construction and equipment. ¹	Other permanent investments.	Cash on hand.	Bills and accounts receivable.	Supplies.	Sundries.	Profit and loss deficit for companies reporting deficit.	
1	United States.....	967	\$2,545,132,305	\$2,167,634,077	\$152,513,997	\$28,021,853	\$22,448,700	\$10,610,928	\$152,617,703	\$11,285,047	\$1,123,330
2	Alabama.....	9	15,451,927	13,999,633	949,116	78,370	94,304	38,101	278,765	13,638	.....
3	Arkansas.....	7	2,501,330	2,207,346	40,486	27,268	6,106	11,149	206,975	.....	.....
4	California.....	35	82,602,550	74,624,168	1,805,168	1,186,782	515,963	832,641	3,632,077	5,751	.....
5	Colorado.....	7	16,820,646	16,174,735	210,062	149,637	89,296	115,097	121,850	9,967	.....
6	Connecticut.....	25	45,645,833	42,482,731	2,121,580	300,733	72,907	191,509	371,430	104,993	.....
7	Delaware.....	3	5,289,910	5,104,476	.....	71,386	40,860	47,361	7,977	17,850	.....
8	Florida.....	6	3,822,637	3,710,728	.....	47,861	32,994	23,453	7,601	.....	.....
9	Georgia.....	10	27,056,898	26,157,678	134,800	196,523	212,437	142,571	212,894	.....	.....
10	Illinois.....	56	284,963,125	225,507,387	40,237,103	1,819,913	1,123,128	899,638	12,432,980	2,933,026	826,030
11	Indiana.....	26	43,454,495	39,420,184	10,435	371,275	107,448	170,915	3,241,044	133,194	.....
12	Iowa.....	22	19,977,660	18,035,123	47,704	243,518	226,522	80,498	1,214,397	129,898	.....
13	Kansas.....	11	3,318,649	3,069,321	.....	14,622	2,942	14,379	190,206	7,179	6,655
14	Kentucky.....	12	25,239,786	22,850,276	40,928	333,415	43,307	139,698	1,810,241	21,921	.....
15	Louisiana.....	8	24,064,087	14,282,507	.....	243,853	97,891	103,969	9,329,908	25,959	.....
16	Maine.....	20	12,476,227	11,176,556	559,960	86,503	69,716	55,567	209,555	318,370	.....
17	Maryland.....	12	69,710,668	68,711,891	30,000	187,137	22,735	131,666	522,807	104,432	.....
18	Massachusetts.....	92	121,627,650	109,782,044	212,011	3,302,901	1,387,568	1,451,677	5,065,068	406,371	.....
19	Michigan.....	24	66,227,886	55,582,232	2,068,542	330,675	531,320	174,632	7,416,002	124,483	.....
20	Minnesota.....	5	40,016,285	39,273,860	.....	477,985	4,862	101,286	147,242	11,100	.....
21	Mississippi.....	5	1,444,119	1,268,084	114,196	11,196	5,928	2,390	40,540	1,785	.....
22	Missouri.....	17	149,060,520	117,628,659	24,379,270	1,053,495	299,330	445,988	4,743,535	510,243	.....
23	Montana.....	5	3,748,096	3,228,532	.....	46,521	37,782	22,569	347,107	65,665	.....
24	Nebraska.....	4	8,807,086	8,599,242	.....	100,961	9,175	19,209	76,654	1,845	.....
25	New Hampshire.....	13	4,485,194	4,118,457	.....	177,579	108,629	6,636	20,163	3,730	.....
26	New Jersey.....	29	132,029,283	126,599,270	880,908	439,114	278,001	388,461	2,549,375	954,154	134,148
27	New York.....	119	643,014,844	521,942,957	36,751,267	11,859,612	8,815,728	2,116,654	58,140,377	3,388,249	.....
28	North Carolina.....	7	4,430,976	2,408,661	639,690	24,076	89,318	36,408	1,198,720	34,103	16,814
29	Ohio.....	66	181,414,088	169,058,687	1,147,336	1,705,688	2,320,577	664,396	6,291,536	225,868	.....
30	Oregon.....	6	6,563,793	6,235,570	.....	89,601	8,680	89,341	118,864	21,737	.....
31	Pennsylvania.....	196	314,258,454	246,118,011	31,568,967	1,307,980	3,454,482	1,061,225	29,899,316	848,523	.....
32	Rhode Island.....	7	24,488,395	23,871,751	.....	38,443	147,373	160,607	1,589	268,632	.....
33	South Carolina.....	7	6,689,525	4,523,752	1,730,000	8,244	58,631	45,693	316,961	6,244	.....
34	Tennessee.....	8	18,142,307	16,931,576	582,015	64,557	491,801	62,046	9,187	1,122	.....
35	Texas.....	17	16,465,080	15,755,440	140,000	231,886	31,141	65,784	240,029	800	.....
36	Utah.....	3	6,224,674	4,314,156	1,682,600	145,123	.....	50,795	32,000	.....	.....
37	Vermont.....	9	3,203,339	2,850,460	.....	20,477	10,506	6,041	292,989	22,866	.....
38	Virginia.....	16	19,773,297	15,414,124	3,284,535	236,557	598,200	30,732	151,552	57,597	.....
39	Washington.....	8	20,043,826	18,574,439	191,793	406,694	234,894	274,026	361,980	.....	.....
40	West Virginia.....	8	10,005,352	9,039,281	244,819	106,805	5,976	4,529	601,492	2,450	.....
41	Wisconsin.....	17	31,334,728	29,359,238	708,756	225,314	333,118	338,740	367,214	2,348	.....
42	All other states and territories. ³	11	29,277,080	27,630,859	.....	251,623	477,149	42,831	375,564	499,054	139,683
43	Hawaii and Porto Rico.	5	3,502,875	2,181,593	332,314	102,950	64,868	31,950	778,161	11,039	.....

¹ Exclusive of reports for 20 companies which failed to furnish this information.² Includes electric light plants owned by companies reporting.³ Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

FINANCIAL OPERATIONS.

91

AND LESSOR COMPANIES, BY STATES AND TERRITORIES: 1902.¹

LIABILITIES.									Cost of construction during the year. ²	
Total.	Capital stock.	Funded debt.	Bills and accounts payable.	Interest due.	Dividends due.	Sundries.	Profit and loss surplus for companies reporting surplus.	Net surplus for states showing surplus.		
\$2,545,132,306	\$1,266,883,289	\$974,112,422	\$101,704,634	\$14,497,670	\$2,543,823	\$133,399,306	\$51,991,159	\$41,829,442	\$126,682,473	1
15,451,927	7,696,900	6,678,500	599,152	133,272	2,000	48,343	298,760	280,122	1,829,616	2
2,501,330	885,300	1,068,000	180,425	32,590		242,025	102,990	102,990	82,272	3
82,602,550	46,022,099	30,529,500	1,650,635	538,108	116,953	1,934,206	1,811,049	1,805,298	2,164,806	4
16,820,646	7,362,804	8,295,560	418,881	239,493		138,848	365,060		402,023	5
45,645,833	25,211,640	17,433,500	1,984,704	128,330		298,491	589,168	484,175	1,333,893	6
5,289,910	2,264,990	2,424,000	523,953	10,920		30,408	35,639	17,789	1,045,456	7
3,822,637	1,949,400	1,531,000	84,309	112,412	600	16,693	128,223	128,223	97,467	8
27,056,898	12,957,600	13,081,500	163,981	54,943		127,358	671,566	671,566	673,406	9
284,953,125	158,713,616	97,885,267	8,766,906	2,084,693	300,673	15,094,975	2,106,998		13,670,690	10
43,454,496	16,635,028	21,550,760	3,091,924	102,640	8,015	1,664,308	401,820	268,626	1,891,946	11
19,977,660	10,541,200	6,770,333	1,338,918	73,101	1,616	62,956	1,189,536	1,059,638	1,578,741	12
3,318,649	2,162,000	1,115,000	37,332	1,416		2,377	524		3,933	13
25,239,786	11,330,900	12,204,300	284,044	294,275	77,250	168,027	880,990	859,069	371,058	14
24,084,087	12,484,900	10,010,000	291,257	289,200	114,203	259,547	634,980	609,021	490,546	15
12,476,227	5,053,055	6,155,000	746,799	60,967		80,499	379,907	61,587	1,181,015	16
69,710,668	16,036,006	52,359,194	251,557	533,628		339,084	191,199	86,767	1,492,101	17
121,627,650	59,378,602	37,966,942	16,241,821	251,987	337,736	5,066,356	2,384,207	1,977,836	12,821,331	18
66,227,886	29,033,100	32,596,800	2,838,408	539,992	132,234	113,384	973,968	849,485	1,750,484	19
40,016,285	23,280,000	13,226,000	122,908	229,928	300,200	67,639	2,789,610	2,778,510	1,044,300	20
1,444,119	626,500	644,000	134,628	8,212		8,070	24,709	20,924	311,417	21
149,060,520	68,234,100	71,474,816	5,760,149	948,259	206,621	1,868,298	568,277	58,084	2,167,875	22
3,748,096	2,045,613	1,275,000	984	134,750		124,556	167,193	101,628	65,320	23
8,807,086	6,012,125	2,395,000	127,436		59,205	21,000	192,320	190,475	211,689	24
4,435,194	2,333,200	1,556,000	275,582	4,096		174,207	92,109	88,379	226,423	25
132,029,283	69,333,440	57,490,750	2,994,778	409,014	4,827	976,468	820,006		9,437,053	26
643,014,844	276,209,172	252,929,373	23,423,952	3,796,284	318,151	69,296,706	17,089,206	13,650,957	36,278,382	27
4,430,976	1,995,625	1,880,500	392,630	60,730		84,202	17,289		253,248	28
181,414,088	108,638,650	60,942,000	6,441,750	450,290	175,358	2,349,156	2,416,889	2,191,021	11,962,321	29
6,563,793	2,788,560	2,737,000	214,452	26,890		142,536	654,365	632,628	330,939	30
314,256,454	183,429,124	75,563,700	11,876,068	2,019,582	185,086	30,802,698	10,382,206	9,533,683	11,093,181	31
24,488,395	16,375,000	6,221,200	1,265,385	60,857		6,492	559,461	290,829	1,675,228	32
6,699,526	2,589,400	3,336,000	445,384	29,737		213,538	75,466	69,222	308,214	33
18,142,307	8,160,400	8,686,400	908,620	31,620		88,991	266,276	265,154	1,173,083	34
16,465,080	9,150,900	3,952,900	2,968,926	90,873	6,291	10,347	294,843	294,043	588,397	35
6,224,674	3,110,000	2,800,000	251,279				63,395	63,395	163,365	36
3,203,339	1,835,100	931,600	66,201	23,313	1,650	310,621	34,854	11,968	72,382	37
19,773,297	7,277,000	11,019,314	889,006	118,043	18,069	242,225	209,641	152,044	605,050	38
20,043,826	10,636,400	7,747,813	845,156	121,355		137,717	555,385	555,385	3,299,615	39
10,005,352	4,273,600	5,308,400	262,527	12,301		12,762	135,772	133,322	734,089	40
31,334,728	15,178,600	13,058,350	1,100,953	204,298	69,667	569,926	1,132,984	1,130,586	1,826,050	41
29,277,080	17,651,650	9,291,150	1,450,936	233,271	107,423	183,279	359,371		437,210	42
3,502,875	2,021,340	1,163,800	55,276	20,146	2,899	109,068	130,331	119,292	310	43

The methods of street railway companies in preparing their balance sheets are not uniform, and, although every effort has been made by the Bureau of the Census to bring the items to a comparable basis, it has been impossible in some cases to do so. Moreover, certain headings on both sides of the balance sheet represent such a variety of items that the national and state totals for these headings do not give a precise idea of the financial situation of street railways.

The total assets and liabilities, as shown in the table, have been obtained by adding all assets and liabilities reported by individual companies without setting off the profit-and-loss surplus of some of the companies against the profit-and-loss deficit of others. The aggregate surplus reported by 463 companies was \$51,991,159, and the aggregate deficit reported by 225 companies was \$11,285,047, while 279 companies reported neither surplus nor deficit. The latter are largely lessor companies which have no current transactions, their income being directly disbursed to their stockholders and bondholders by the operating companies. The net surplus for the United States, obtained by deducting the deficits from the gross surplus, was \$40,706,112. If the deficits were similarly deducted from total assets and liabilities they would be reduced to \$2,533,847,258. The table also shows for each state the net surplus or deficit obtained by combining the figures for companies showing a surplus with those for companies showing a deficit.

More than five-sixths of the reported assets of the street railway companies are placed under the head "cost of construction and equipment." It should be distinctly understood that this figure gives no indication of the actual cash which has been invested in tracks, appliances, and equipment. The Bureau of the Census undertook to secure an itemized statement of cost of construction from each company in accordance with the form prescribed by the American Street Railway Accountants' Association. Many companies furnished satisfactory returns, but many others were entirely unable to do so. The most important of the considerations that make the figures of cost in the balance sheet unsatisfactory is that a large proportion of the railway mileage, particularly of that which has had the highest valuation placed upon it, has changed hands during recent years, usually through the process of consolidation, but sometimes through reorganization after bankruptcy or otherwise. Where this has occurred, the new company has, naturally enough, treated as the "cost of construction and equipment" the amount which it has actually paid in cash or securities for the assets of the old company or companies, as "going" concerns—an amount which may be much more or much less than their original cost or the cost of duplicating them to-day. The new companies would seldom be able, even if they desired, to ascertain from the records of the old companies the amounts originally invested, either by items or as a whole. Another reason for inability to present

itemized construction accounts is found in the common practice of letting contracts for the entire construction and equipment of railways at a lump sum. Such contracts are sometimes given to a construction company which is composed largely or wholly of the same men who are promoting the street railway company itself.

The item "other permanent investments" is variously interpreted by individual companies in making up their balance sheets. Some of them are disposed to put the value of their franchises under this head. The Bureau of the Census has sought to secure uniformity in the classification presented in this report, and has included under "other permanent investments" only the value of investments outside of street railways and lighting plants directly owned by the reporting companies which amounted to \$152,513,997. The most important form of such investments consists of the stocks and bonds of other street railway companies, which were usually wholly or partly controlled by the companies holding such securities, but which still maintained an independent existence and made an independent report to the Bureau of the Census. To the extent that securities of reporting railway companies are held by other reporting companies there is a duplication of both assets and liabilities. In cases where an operating company has completely taken over the business of a subsidiary company, which made no separate return to the Bureau of the Census, the value of the securities held has been treated as part of the cost of construction of the parent company. The cost of electric lighting plants and of parks or other real estate used in direct connection with the street railway business is also included with "cost of construction and equipment." On the other hand, investments in other forms of real estate, in water plants, ice plants, or other industrial enterprises, or in securities of any sort, are covered by the second head of the balance sheet. In some cases the cost of such outside properties is so closely interwoven with the cost of street railways that the segregation is based on estimates rather than on precise bookkeeping accounts. Some companies reported their own stocks and bonds held in the treasury as an asset, but in making up the table such securities have uniformly been treated as though not issued and have been omitted from both sides of the balance sheet.

The sundry assets, \$152,617,703, includes a variety of items. In a number of cases companies reported the value of franchises—corresponding practically to the difference between their reported cost of construction and other permanent investments on the one hand and the amount of stocks and bonds issued, on the other—as a separate item, and this has been included here rather than under "cost of construction" or "other permanent investments." It must not be supposed, however, that the total value of all street railway franchises, as distinct from their cash cost, is shown under "sundry assets." Advances made by controlling companies to their sub-

subsidiary companies for improvements on their lines or other purposes are also placed under this head. It is probable, however, that a part of the item "bills and accounts receivable" also represents advances of this sort that have not been specifically indicated as such by the companies. The balance sheet totals involve duplication to the extent of such advances from one company to another; the expenditures made out of them appear, usually as "cost of construction and equipment," among the assets of the subsidiary companies, and the obligations to the controlling companies appear among their liabilities.

The items "capital stock" \$1,266,883,289, and "funded debt" \$974,112,422, in the balance sheet are somewhat smaller than the amounts of securities reported as issued in Table 93, which were \$1,315,572,960 and \$992,709,139, respectively. Some of the operating companies which reported capital stock and funded debt did not present balance sheets. Again the capital stock of some other companies was not paid up in full, only the amount paid being treated as a liability in the balance sheet. If the par value of such stock were taken, it would be necessary to offset the part not paid in by an item "sundry assets" on the assets side, representing, presumably, real or anticipated franchise value. The practice of issuing stock without full payment is most conspicuous in Pennsylvania, where the total par value of stocks issued by operating and lessor street railway companies was reported at \$211,728,495, while the amount appearing in the balance sheet as paid in was \$183,429,124, a difference of \$28,299,371. In Philadelphia many of the lessor companies have had only a fraction of their stock paid in. Treasury stocks and bonds are excluded from liabilities as from assets.

The item "bills and accounts payable" is a large one, \$101,704,634. A considerable number of companies, particularly in Massachusetts, seem to have adopted the

policy of carrying permanently a heavy floating debt, the proceeds of which have been used in construction and equipment. In other cases new companies that have not yet completed their entire road, or that have only recently done so, are indebted to the contractors for nearly or quite the full cost of construction and have as yet floated no securities. There are a few cases also in which controlling companies not reporting to the Bureau of the Census have made advances to the companies which they control and which did report.

The amount of "interest due" represents in part that which has accrued but is not yet payable; in part that which is payable but for which coupons have not yet been presented; but it apparently represents chiefly interest which the companies have been unable to pay.

Under "sundry liabilities," which aggregated \$133,399,308, the most important single item consists of the obligations of the subsidiary companies to controlling companies.

Cost of construction during the year.—An additional column on the same page with the balance sheet shows the cost of new construction and equipment charged to the capital account during the census year, as reported by street railway companies. It does not include the cost of railways under construction but not yet in operation. It has been sought also to omit expenditures which merely represented the purchase of old companies by new ones. The complications in the construction accounts of new railway companies, particularly where settlements have not yet been made with contractors, are such that the figures for cost during the year can not be altogether correct. They serve, however, to give a rough idea of the rapidity with which new construction and improvement are taking place. The total cost of construction during the year amounted to \$126,682,473, or about 6 per cent of the aggregate cost of construction and equipment, as stated in the balance sheet at the end of the year.

CHAPTER VI.

EMPLOYEES, SALARIES, AND WAGES.

Totals for the United States and for states.—Table 92 shows for the United States as a whole and for each of the states the average number of salaried officials and clerks and of wage-earners of different classes, employed by street and electric railways during the census year 1902, together with the total amount of salaries and wages paid to each class. The table includes the figures for 797 of the 817 operating companies. The nonoperating lessor companies have no wage-earners; and, while they maintain a formal organization and have certain officers, these, in most cases, receive no compensation. The 20 companies that failed to report statistics of employees and wages include the 18 companies mentioned on page 54 as making no financial returns. In addition to these the Los Angeles Traction Company, with 26 miles of track and 5,040,154 passengers, and the Punxsutawney (Pa.) Street Railway Company, with 12.13 miles of track and 988,555 passengers, failed to report employees and wages. The total trackage of the companies not covered by the statistics on this subject was 417.03 miles.

In accordance with the practice adopted by the Bureau of the Census for the investigation of manufactures,¹ the average number of employees as stated in Table 92 is computed, not on the basis of the actual time the street railways were in operation, but on the assumption of continuous operation for all companies throughout the year. Thus a company operating six months and employing 30 men during that time is credited with 15 men employed for twelve months. The aim is to show the equivalent of the actual work done during the census year, or, in other words, the number of employees which would be necessary to perform that work if all of them worked the full year.

The average time of operation of the 57 companies which operated less than the full year was about six and two-thirds months. The number of employees of such companies, as calculated according to the method

described, was only 2,066. If the full number had been counted, regardless of the length of their employment, it would not have increased the total number of employees of all companies combined, or the number of most of the classes of employees, by 2 per cent. In some other cases companies operated part of their trackage during only a fraction of the year; but, all things considered, the average number of employees for all railways, as calculated on the basis of an assumed full year of operation, is not materially less than the number actually employed at any given time during the year.

Table 92 shows that the average number of salaried officials and clerks employed by the street railways of the United States in 1902 was 7,128 and the average number of wage-earners of all classes 133,641, a total of 140,769 employees. The salaries paid amounted to \$7,439,716 and the wages to \$80,770,449, a total of \$88,210,165 for salaries and wages. The wages alone, exclusive of salaries, were 56.8 per cent of the total operating expenses of the street railway companies. By far the most important groups of employees are conductors and motormen. These two classes, which are approximately equal in number and in wages received, together constitute about three-fifths of the total number of wage-earners, and their aggregate wages are equal to more than one-third of the operating expenses of street railway companies. Road and track men and mechanics are the next most important classes of employees.

Employees, salaries, and wages of companies classified according to power.—Table 69 shows for all companies combined and for the various groups of companies classified according to power, the number and compensation of salaried officials and clerks; the number and wages of all wage-earners and of conductors and motormen, respectively; and the relation of certain of these statistics to the length of track, to car mileage, and to the number of fare passengers carried.

¹See Twelfth Census, Vol. VII, page cvi.

TABLE 69.—EMPLOYEES, SALARIES, AND WAGES OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.¹

	Total.	ELECTRIC, SURFACE.			Animal.	Steam and electric elevated.	Cable, surface, and inclined planes.	Steam, surface.
		Without commercial lighting.	With commercial lighting.	Part time.				
Number of companies.....	797	554	112	57	52	5	14	3
Salaried officials and clerks:								
Average number.....	7,128	5,617	990	184	44	250	39	4
Per mile of track.....	0.322	0.305	0.402	0.221	0.282	1.096	1.178	0.332
Per 100,000 car miles run during the year.....	0.631	0.598	1.164	1.413	0.776	0.299	1.240	3.698
Per 100,000 fare passengers carried during the year.....	0.151	0.140	0.324	0.488	0.131	0.079	0.201	2.354
Salaries.....	\$7,439,716	\$5,950,926	\$998,460	\$121,124	\$27,927	\$298,137	\$40,622	\$2,520
Wage-earners:								
Average number.....	133,641	111,044	12,498	1,882	992	6,768	441	16
Per mile of track.....	6.031	6.022	5.080	2.264	6.354	29.671	13.319	1.327
Per 100,000 car miles run during the year.....	11.830	11.826	14.696	14.455	17.497	8.091	14.026	14.774
Per 100,000 fare passengers carried during the year.....	2.829	2.768	4.087	4.987	2.956	2.148	2.278	9.415
Wages.....	\$80,770,449	\$67,994,546	\$6,741,201	\$698,667	\$576,285	\$4,512,338	\$330,795	\$6,617
Per mile of track.....	\$3,645	\$3,683	\$2,740	\$841	\$8,691	\$19,782	\$9,991	\$549
Per 100,000 car miles run during the year.....	\$7,150	\$7,232	\$7,927	\$5,366	\$10,164	\$5,394	\$10,521	\$6,110
Per 100,000 fare passengers carried during the year.....	\$1,710	\$1,692	\$2,204	\$1,851	\$1,717	\$1,432	\$1,709	\$3,894
Conductors:								
Average number.....	40,141	34,222	3,090	548	297	1,823	159	2
Wages.....	\$24,025,204	\$20,981,435	\$1,545,874	\$198,109	\$164,894	\$1,015,888	\$118,044	\$960
Motormen:								
Average number.....	40,003	34,456	3,235	590	348	1,228	140	4
Wages.....	\$24,617,155	\$21,288,717	\$1,680,086	\$213,814	\$188,303	\$1,137,951	\$105,629	\$2,655

¹ Exclusive of reports for 20 companies which failed to furnish this information.

Very significant differences in these relations appear among the different classes of companies, although the differences are probably due not so much to diversity in the methods of traction as to variation in the density of traffic among the several classes. For all classes of railways combined the number of salaried employees was 0.322 per mile of track, 0.631 per 100,000 car miles run during the year, and 0.151 per 100,000 fare passengers carried during the year. The number of wage-earners was 6.031 per mile of track, 11.830 per 100,000 car miles, and 2.829 per 100,000 fare passengers. These figures exceed slightly the averages for the most important class of companies, full-time electric surface railways without commercial lighting. The annual wages paid by all companies were \$3,645 per mile of single track, \$7,150 per 100,000 car miles, and \$1,710 per 100,000 fare passengers. As might be expected, the companies furnishing commercial lighting, part of whose employees are engaged in the lighting branch of the business, show relatively more salaried employees, wage-earners, and wages, in proportion to the car mileage and passengers, than companies without

commercial lighting. The large number of wage-earners in proportion to car mileage shown for animal power railways is chiefly due to the slow speed of the cars. Elevated railways, with their extremely dense traffic, naturally show a much larger proportion of employees per mile of track than other classes of railways; but, on the other hand, the density of traffic and the high speed of elevated railways resulted in their showing a relatively small number of employees and a relatively small amount of salaries and wages in proportion to car mileage and to fare passengers carried. The number of wage-earners per 100,000 fare passengers for the cable roads was less than for any other group except the elevated roads. The inclined plane roads had 2.107, and the ordinary cable roads 2.320 wage-earners per 100,000 fare passengers.

Employees, salaries, and wages of companies classified according to population.—Table 70 presents for all railways classified according to population the same data as are presented in Table 69. The corresponding figures for full-time electric surface railways without commercial lighting are shown in Table 71.

TABLE 70.—EMPLOYEES, SALARIES, AND WAGES OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	797	65	46	83	312	53	238
Salaried officials and clerks:							
Average number.....	7,128	2,549	1,211	708	838	482	1,345
Per mile of track.....	0.322	0.514	0.343	0.248	0.384	0.174	0.229
Per 100,000 car miles run during the year.....	0.631	0.489	0.507	0.630	1.334	1.042	0.904
Per 100,000 fare passengers carried during the year.....	0.151	0.104	0.122	0.169	0.438	0.434	0.239
Salaries.....	\$7,439,716	\$2,720,425	\$1,465,045	\$829,372	\$686,253	\$477,601	\$1,261,020
Wage-earners:							
Average number.....	133,641	61,699	27,604	13,458	7,279	5,764	17,837
Per mile of track.....	6.031	12.438	7.811	4.742	3.333	2.084	3.085
Per 100,000 car miles run during the year.....	11.830	11.837	11.556	12.053	11.586	12.461	11.968
Per 100,000 fare passengers carried during the year.....	2.829	2.516	2.790	3.229	3.902	5.186	3.167
Wages.....	\$80,770,449	\$39,181,336	\$17,201,939	\$7,626,882	\$3,727,549	\$3,155,616	\$9,877,127
Per mile of track.....	\$3,645	\$7,899	\$4,868	\$2,688	\$1,707	\$1,141	\$1,680
Per 100,000 car miles run during the year.....	\$7,150	\$7,517	\$7,203	\$6,831	\$5,983	\$6,822	\$6,638
Per 100,000 fare passengers carried during the year.....	\$1,710	\$1,508	\$1,739	\$1,830	\$1,947	\$2,839	\$1,754
Conductors:							
Average number.....	40,141	18,897	8,645	4,083	1,849	1,351	5,316
Wages.....	\$24,025,204	\$11,860,269	\$5,244,932	\$2,247,928	\$911,909	\$735,181	\$3,024,905
Motormen:							
Average number.....	40,003	17,867	8,785	4,242	2,360	1,424	5,324
Wages.....	\$24,617,155	\$11,813,620	\$5,384,432	\$2,858,346	\$1,186,679	\$788,645	\$3,066,433

¹ Exclusive of reports for 20 companies which failed to furnish this information.

STREET AND ELECTRIC RAILWAYS.

TABLE 71.—EMPLOYEES, SALARIES, AND WAGES OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902.¹

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of companies.....	554	47	37	66	165	40	199
Salaried officials and clerks:							
Average number.....	5,617	2,259	1,026	457	438	356	1,081
Per mile of track.....	0.805	0.483	0.318	0.219	0.335	0.165	0.217
Per 100,000 car miles run during the year.....	0.598	0.522	0.469	0.555	1.141	0.985	0.830
Per 100,000 fare passengers carried during the year.....	0.140	0.107	0.114	0.150	0.351	0.432	0.218
Salaries.....	\$5,950,926	\$2,390,778	\$1,293,521	\$537,295	\$340,658	\$371,944	\$1,016,730
Wage-earners:							
Average number.....	111,044	58,957	24,649	8,709	4,008	4,329	15,392
Per mile of track.....	6.022	11.527	7.642	4.167	3.062	2.002	3.096
Per 100,000 car miles run during the year.....	11.825	12.461	11.260	10.577	10.445	11.980	11.819
Per 100,000 fare passengers carried during the year.....	2.768	2.566	2.747	2.852	3.210	5.249	3.082
Wages.....	\$67,904,546	\$34,094,449	\$15,325,583	\$5,256,287	\$2,163,300	\$2,432,536	\$8,632,391
Per mile of track.....	\$3,683	\$7,294	\$4,751	\$2,515	\$1,653	\$1,125	\$1,737
Per 100,000 car miles run during the year.....	\$7,232	\$7,874	\$7,001	\$5,384	\$5,637	\$6,732	\$6,628
Per 100,000 fare passengers carried during the year.....	\$1,692	\$1,621	\$1,708	\$1,721	\$1,733	\$2,949	\$1,729
Conductors:							
Average number.....	34,222	16,765	7,847	2,821	1,165	998	4,626
Wages.....	\$20,981,455	\$10,670,686	\$4,745,919	\$1,697,605	\$619,268	\$552,534	\$2,695,423
Motormen:							
Average number.....	34,458	16,338	8,060	2,969	1,421	1,049	4,681
Wages.....	\$21,288,717	\$10,509,465	\$4,903,873	\$1,790,580	\$764,662	\$583,345	\$2,736,792

¹ Exclusive of reports for 18 companies which failed to furnish this information.

It appears from Table 71 that the number of wage-earners per mile of track, on railways of the more typical class, is greatest in urban centers of the first group, and that the number decreases rapidly with decreasing population of urban centers. An even greater decrease is shown in wages per mile of track. The explanation is found obviously in the declining density of traffic with decreasing population. The ratio of wage-earners and wages to car miles run during the year also decreases with population, though in a much less marked degree. In explanation of the fact that the number of employees per 100,000 car miles is greater in large cities than in smaller towns, it may be said that certain classes of men, such as starters, switchmen, transfermen at junction points, and the like are not required in the smaller towns. In some small towns a single person serves both as conductor and motorman.

On the other hand, the density of traffic per car mile increases, broadly speaking, with population, and we find accordingly that the ratio of the number of employees to the number of fare passengers carried during the year decreases with increasing population. How-

ever, on account of the general tendency of the rate of wages to increase with population, there is less difference in the ratio of wages to passengers among the four urban groups than in the ratio of wage-earners to passengers. The ratio of wage-earners to passengers carried is larger in the group of fast, long interurban railways than in any of the urban groups, because of the long distance traveled by passengers.

Relation of employees to trackage and traffic in the ten largest cities.—Table 72 shows the number of salaried employees and the number of wage-earners on the surface railways, including electric, animal, and cable lines,¹ in the ten largest cities of the United States, together with the relation between these numbers and the traffic. It should be noted that, in some cases, the area and population of the cities as covered by this table do not correspond exactly with the area and population of the "urban centers," of which these cities are the chief part.

¹ The Brooklyn and Boston companies which operate elevated as well as surface tracks are included in the table.

TABLE 72.—WAGE-EARNERS AND SALARIED EMPLOYEES OF SURFACE RAILWAYS, IN THE TEN LARGEST CITIES: 1902.

CITY.	Number of miles of track.	Total car mileage.	Number of fare passengers.	SALARIED OFFICIALS AND CLERKS.				WAGE-EARNERS.			
				Number.	Per mile of track.	Per 100,000 car miles per year.	Per 100,000 fare passengers per year.	Number.	Per mile of track.	Per 100,000 car miles per year.	Per 100,000 fare passengers per year.
New York, N. Y.....	1,103.45	136,179,817	718,278,082	614	0.556	0.451	0.085	20,627	18.693	15.147	2.872
Chicago, Ill. ¹	886.86	74,011,090	305,905,617	283	0.319	0.382	0.093	7,426	8.373	10.084	2.428
Philadelphia, Pa.....	517.53	61,521,375	331,304,685	258	0.499	0.419	0.078	6,980	13.487	11.346	2.107
St. Louis, Mo.....	360.89	29,602,974	122,063,877	138	0.382	0.466	0.113	2,438	6.756	8.236	1.997
Boston, Mass.....	406.13	45,999,999	222,484,811	450	1.108	0.978	0.202	6,769	16.667	14.715	3.042
Baltimore, Md.....	365.12	23,876,837	96,763,878	139	0.381	0.582	0.144	2,762	7.565	11.568	2.854
Cleveland, Ohio.....	237.04	18,768,515	81,370,202	95	0.401	0.506	0.117	2,104	8.876	11.210	2.586
Buffalo, N. Y.....	320.48	17,486,012	74,136,881	105	0.328	0.600	0.142	2,259	7.049	12.919	3.047
San Francisco, Cal.....	276.50	20,620,581	117,357,877	102	0.369	0.495	0.087	2,957	10.694	14.340	2.520
Pittsburg-Allegheny, Pa.....	410.01	33,067,964	161,436,822	155	0.378	0.469	0.096	4,016	9.795	12.145	2.488

¹ One company failed to furnish this information.

Marked differences appear among the cities in the ratio of wage-earners to track mileage. This ratio is particularly affected by the density of traffic, being high where the number of car miles operated per mile of track is great. Much less marked are the differences in the ratio of the number of wage-earners to the number of car miles run during the year. The highest ratio appears in New York, where there were 15.147 wage-earners per 100,000 car miles. Boston and San Francisco show nearly as large a proportion. The lowest ratio of wage-earners to car mileage is found in St. Louis and Chicago. As regards the relation of the number of employees to the number of fare passengers carried during the year, Buffalo and Boston present the highest ratio, both cities having more than 3 wage-earners per 100,000 passengers carried annually. The lowest ratio of wage-earners to fare passengers carried appears in St. Louis and Philadelphia.

Method of presenting wage statistics.—In the investigation of the wages of street railway employees the same methods have been followed that were adopted in the special investigation on employees and wages in manufacturing industries published by the Bureau of the Census in 1903.¹ The number of wage-earners

¹ For fuller description of these methods see Twelfth Census Report on Employees and Wages, 1903, pages xxiv-xxviii.

whose wages fall within specified limits has been ascertained and presented.

As more fully shown in the Report on Manufactures (Vol. VII, page ccxv), great caution must be exercised in making calculations of the annual average earnings of wage-earners from the statistics of aggregate wages and average number employed. This caution applies with full force to the statistics presented in this report. The number and complexity of the other necessary inquiries in the street railway schedule precluded the use of such exhaustive methods of securing wage returns as were employed in the special investigation on employees and wages in the manufacturing industries. The companies were, therefore, asked to compute directly the number of wage-earners in the different classes receiving stated rates of pay, and the special agents of the Bureau of the Census consulted pay rolls only incidentally and by way of verification.

Classified wages for all electric surface railways.—Table 73 shows for all wage-earners on electric surface railways, and for the leading classes separately, the number receiving stated rates of daily wages within 25-cent limits. It shows also the percentage which the number falling within each wage group bears to the total number of wage-earners of the class, together with cumulative percentages.

TABLE 73.—DISTRIBUTION OF WAGE-EARNERS OF ALL ELECTRIC SURFACE RAILWAY COMPANIES ACCORDING TO DAILY WAGES RECEIVED: 1902.

[Each cumulative percentage shows the proportion of the total number receiving a wage as great as, or greater than, the lowest rate of the given wage group.]

RATE PER DAY (DOLLARS).	ALL CLASSES.			CONDUCTORS.			MOTORMEN.			ROAD AND TRACK MEN.		
	Percentage.			Percentage.			Percentage.			Percentage.		
	Number.	Of total.	Cumulative.	Number.	Of total.	Cumulative.	Number.	Of total.	Cumulative.	Number.	Of total.	Cumulative.
Total	94,874	100.0	.....	31,869	100.0	.....	32,412	100.0	.....	9,926	100.0	.....
Less than 1.00.....	656	0.7	100.0	50	0.2	100.0	23	0.1	100.0	473	4.7	100.0
1.00 to 1.24.....	2,719	2.9	99.3	899	2.8	99.8	884	2.7	99.9	477	4.8	95.3
1.25 to 1.49.....	4,468	4.7	96.4	1,046	3.3	97.0	1,123	3.5	97.2	1,368	13.8	90.5
1.50 to 1.74.....	15,431	16.3	91.7	3,983	12.5	93.7	3,374	10.4	93.7	4,505	45.4	76.7
1.75 to 1.99.....	15,213	16.0	75.4	5,426	17.0	81.2	5,481	16.9	83.3	1,280	12.9	31.3
2.00 to 2.24.....	39,663	41.8	59.4	17,059	53.5	64.2	16,665	51.4	66.4	1,229	12.4	18.4
2.25 to 2.49.....	10,421	11.0	17.6	3,124	9.8	10.7	4,325	13.4	15.0	384	3.9	6.0
2.50 to 2.74.....	3,262	3.4	6.6	192	0.6	0.9	291	0.9	1.6	162	1.6	2.1
2.75 to 2.99.....	1,045	1.1	3.2	17	0.1	0.3	7	(¹)	0.7	8	0.1	0.5
3.00 and over.....	1,996	2.1	2.1	73	0.2	0.2	239	0.7	0.7	40	0.4	0.4

RATE PER DAY (DOLLARS).	ENGINEERS.			FIREMEN.			MECHANICS.			ALL OTHER CLASSES.		
	Percentage.			Percentage.			Percentage.			Percentage.		
	Number.	Of total.	Cumulative.	Number.	Of total.	Cumulative.	Number.	Of total.	Cumulative.	Number.	Of total.	Cumulative.
Total	1,534	100.0	.....	2,344	100.0	.....	6,753	100.0	.....	10,036	100.0	.....
Less than 1.00.....	3	0.2	100.0	16	0.7	100.0	21	0.3	100.0	70	0.7	100.0
1.00 to 1.24.....	5	0.3	99.8	76	3.2	99.3	83	1.2	99.7	295	2.9	99.3
1.25 to 1.49.....	39	2.5	99.5	135	5.8	96.1	195	2.9	98.5	562	5.6	95.4
1.50 to 1.74.....	104	6.8	97.0	469	20.0	90.3	896	13.3	95.6	2,100	20.9	90.8
1.75 to 1.99.....	89	5.8	90.2	637	27.2	70.3	1,062	15.7	82.3	1,223	12.2	69.9
2.00 to 2.24.....	295	19.2	84.4	770	32.8	43.1	1,707	25.3	66.6	1,953	19.5	57.7
2.25 to 2.49.....	187	12.2	65.2	171	7.3	10.3	1,017	15.1	41.3	1,213	12.1	38.2
2.50 to 2.74.....	274	17.9	53.0	48	2.1	3.0	936	13.9	26.2	1,350	13.5	26.1
2.75 to 2.99.....	115	7.5	35.1	1	(¹)	0.9	427	6.3	12.3	470	4.7	12.6
3.00 and over.....	423	27.6	27.6	21	0.9	0.9	409	6.0	6.0	791	7.9	7.9

¹ Less than one-tenth of 1 per cent.

The statistics of classified wage-earners presented in this and the following tables are confined to electric surface railways (including those with and without commercial lighting), because the occupations for other classes of railways differ so much in character as to render comparison misleading. Even of the electric surface railway companies, 54 failed to report in full regarding classified wages of their employees and have been omitted from the classified figures. The most important of the omissions are the Chicago City Railway Company, the United Railways and Electric Company of Baltimore, the Boston Elevated Railway Company, the St. Louis Transit Company, the Cleveland Electric Railway Company, the Columbus Railway Company, and the Union Railroad Company of Providence.

In the above table the heading "all other classes" includes foremen; inspectors; starters; watchmen; switchmen; hostlers, stablemen, etc.; linemen; dynamo and switchboard men; electricians; and lamp trimmers. The schedule did not call for classified wages of a few other minor groups of wage-earners, and they accordingly do not appear in the table.

The total number of wage-earners covered by Table 73 is 94,874, which is 71 per cent of the average number of wage-earners for all street and electric railways and 75.6 per cent of the average number of wage-earners on all electric surface railways.

The cumulative percentages in the table indicate the proportion of the total number of wage-earners of the different occupations who receive not less than the lowest rate defining the given wage group. Thus for all wage-earners combined the cumulative percentage opposite the group of \$1.75 to \$1.99 per day indicates that 75.4 per cent of the total number receive \$1.75 or more per day. The "percentage of total" opposite the same wage group indicates that 16 per cent of all wage-earners received between \$1.75 and \$1.99, thus leaving 59.4 per cent who receive more than \$1.99, which is the cumulative percentage for the next higher wage group.

Table 74 shows, for the same wage-earners who are covered by Table 73, the median groups of wages for different occupations, the percentage of the total number within each occupation who receive wage rates falling within the median group, and the percentages above and below the median rates.

By a median rate of wages is meant the rate of the employee who stands halfway between the lowest paid and the highest paid employee in the class under consideration; in other words, an absolutely precise median would be a rate such that equal numbers of employees receive wages respectively higher and lower than the rate named. For the purpose of permitting the medians to be calculated closely, the schedule called for a classification of wage-earners by their

precise daily rates of pay. In tabulation, however, the employees have necessarily been grouped according to certain limits, and the median in each case accordingly appears not as a single rate, but as a group, with upper and lower limits 5 cents apart. It follows that the median group itself covers a considerable number of employees and that the number above and below the median group can not, in any case, be exactly equal.

TABLE 74.—Median rates of wages and percentage of wage-earners receiving median rates, and rates above and below median rates, on electric surface railways: 1902.

CLASS.	Median rate (dollars).	PERCENTAGE OF WAGE- EARNERS RECEIVING—		
		Median rate.	Above median rate.	Below median rate.
All classes.....	2.00 to 2.04	32.7	26.7	40.6
Conductors.....	2.00 to 2.04	40.6	23.6	35.8
Motormen.....	2.00 to 2.04	39.2	27.2	33.6
Road and track men.....	1.50 to 1.54	40.4	36.3	23.3
Engineers.....	2.50 to 2.54	13.6	39.4	47.0
Firemen.....	1.80 to 1.84	3.2	47.6	49.2
Mechanics.....	2.00 to 2.04	23.2	43.4	33.4
All other classes.....	2.00 to 2.04	16.9	40.8	42.3

Tables 73 and 74 show that there is not a wide variation in the wages of most employees on electric surface railways. Of all wage-earners on such railways, 32.7 per cent received between \$2 and \$2.04 per day, which is the median group, while 68.8 per cent received between \$1.75 and \$2.49 daily. The rate of \$2 per day is more common than any other and is probably the precise median for all classes combined.

There is less variation in the wages of conductors and motormen than in the wages of all wage-earners combined. The median group for each of these classes is \$2 to \$2.04, and about two-fifths of each class are included in that group. More than four-fifths of all the conductors and five-sixths of all motormen received \$1.75 or more per day, while less than 2 per cent of either class received \$2.50 or more per day.

The median group for road and track men, who are practically all unskilled laborers, is \$1.50 to \$1.54, and more than two-fifths of all such employees fall within that wage group. The engineers are the best paid wage-earners, while the mechanics present the widest range of wages.

Classified wages for electric surface railways in cities of more than 100,000 inhabitants.—Tables 75 and 76 present in the same manner as in the preceding tables the classified wage statistics of wage-earners on electric surface railways in cities of more than 100,000 inhabitants. It will be recalled that the statistics for important companies in Chicago, Baltimore, Boston, St. Louis, Providence, Cleveland, and Columbus are omitted, but it is not probable that this omission seriously affects the distribution of the wage-earners throughout the scale.

EMPLOYEES, SALARIES, AND WAGES.

99

TABLE 75.—DISTRIBUTION OF WAGE-EARNERS OF ELECTRIC SURFACE RAILWAYS IN CITIES OF 100,000 POPULATION AND OVER, ACCORDING TO DAILY WAGES RECEIVED: 1902.

[Each cumulative percentage shows the proportion of the total number receiving a wage as great as, or greater than, the lowest rate of the given wage group.]

RATE PER DAY (DOLLARS).	ALL CLASSES.			CONDUCTORS.			MOTORMEN.			ROAD AND TRACK MEN.		
	Number.	Percentage.		Number.	Percentage.		Number.	Percentage.		Number.	Percentage.	
		Of total.	Cumulative.		Of total.	Cumulative.		Of total.	Cumulative.		Of total.	Cumulative.
Total	56,399	100.0	.....	20,375	100.0	.....	20,063	100.0	.....	4,694	100.0	.....
Less than 1.00	50	0.1	100.0	.....	.....	.....	.....	.....	.....	14	0.3	100.0
1.00 to 1.24	241	0.4	99.9	25	0.1	100.0	15	0.1	100.0	82	1.8	99.7
1.25 to 1.49	1,118	2.0	99.5	265	1.3	99.9	263	1.3	99.9	270	5.8	97.9
1.50 to 1.74	6,456	11.4	97.5	1,676	8.2	98.6	810	4.1	98.6	2,288	48.7	92.1
1.75 to 1.99	7,772	13.8	86.1	2,840	14.0	90.4	2,595	12.9	94.5	676	14.4	43.4
2.00 to 2.24	27,813	49.3	72.3	12,653	62.1	76.4	12,002	59.8	81.6	872	18.6	29.0
2.25 to 2.49	8,668	15.4	23.0	2,771	13.6	14.3	3,979	19.8	21.8	333	7.1	10.4
2.50 to 2.74	2,162	3.8	7.6	125	0.6	0.7	216	1.1	2.0	137	2.9	3.3
2.75 to 2.99	775	1.4	3.8	.....	.....	0.1	.....	.....	0.9	6	0.1	0.4
3.00 and over	1,345	2.4	2.4	21	0.1	0.1	183	0.9	0.9	16	0.3	0.3

RATE PER DAY (DOLLARS).	ENGINEERS.			FIREMEN.			MECHANICS.			ALL OTHER CLASSES.		
	Number.	Percentage.		Number.	Percentage.		Number.	Percentage.		Number.	Percentage.	
		Of total.	Cumulative.		Of total.	Cumulative.		Of total.	Cumulative.		Of total.	Cumulative.
Total	435	100.0	.....	1,161	100.0	.....	4,241	100.0	.....	5,429	100.0	.....
Less than 1.00 .....	.....	.....	.....	.....	.....	.....	3	0.1	100.0	33	0.6	100.0
1.00 to 1.24 .....	.....	.....	.....	4	0.4	100.0	55	1.3	99.9	60	1.1	99.4
1.25 to 1.49 .....	.....	.....	.....	10	0.9	99.6	96	2.3	98.6	214	3.9	98.3
1.50 to 1.74	15	3.4	100.0	99	8.5	98.7	453	10.7	96.3	1,114	20.5	94.4
1.75 to 1.99	5	1.1	96.6	346	29.8	90.2	601	14.2	85.6	709	13.1	73.9
2.00 to 2.24	42	9.7	95.5	490	42.2	60.4	828	19.5	71.4	926	17.1	60.8
2.25 to 2.49	38	8.7	85.8	157	13.5	18.2	702	16.5	51.9	688	12.7	43.7
2.50 to 2.74	63	14.5	77.1	42	3.6	4.7	764	18.0	35.4	815	15.0	31.0
2.75 to 2.99	36	8.3	62.6	1	0.1	1.1	369	8.7	17.4	363	6.7	16.0
3.00 and over	236	54.3	54.3	12	1.0	1.0	370	8.7	8.7	507	9.3	9.3

TABLE 76.—Median rates of wages and percentage of wage-earners receiving median rates, and rates above and below median rates, on electric surface railways in cities of 100,000 population and over: 1902.

CLASS.	Median rate (dollars).	PERCENTAGE OF WAGE-EARNERS RECEIVING—		
		Median rate.	Above median rate.	Below median rate.
All classes	2.00 to 2.04	34.2	38.1	27.7
Conductors	2.00 to 2.04	41.2	35.2	23.6
Motormen	2.00 to 2.04	39.7	41.9	18.4
Road and track men	1.50 to 1.54	43.5	48.6	7.9
Engineers	3.00 to 3.04	15.6	38.7	45.7
Firemen	2.00 to 2.04	40.6	19.8	39.6
Mechanics	2.25 to 2.29	16.0	35.9	48.1
All other classes	2.00 to 2.04	14.2	46.6	39.2

A comparison of the figures in these tables with those for the employees of all electric surface railways combined shows, as might be expected, that there was a somewhat higher range of wages in the large cities. The difference would be still greater and more striking if the wages of employees in the cities of 100,000 and more inhabitants were compared directly with the wages in smaller places. It must be borne in mind that the statistics in Tables 73 and 74 are themselves very greatly influenced by the statistics for wage-earners in cities of more than 100,000 inhabitants. The median rates for all wage-earners combined, and severally for

conductors, motormen, road and track men, and miscellaneous employees, are the same for the largest cities as for the United States as a whole, though in every case a larger proportion of the wage-earners received more than the median rate in the great cities than in the entire country. For engineers, firemen, and mechanics the median was higher in cities of more than 100,000 inhabitants than for the country as a whole.

Classified wages for electric surface railways, by states.—Table 98 shows by states, for electric surface railways, the number of wage-earners of all occupations, and separately those of each important occupation, whose daily wages fall within stated 25-cent limits, together with the 5-cent group within which the median wage falls in each case. The statistics for Illinois, Maryland, Massachusetts, Missouri, and Rhode Island are seriously affected by the omission of important companies.

The highest wages were found in Montana, where the median for all classes of wage-earners on electric surface railways was \$3.50 to \$3.54. The only other states in which the median for all wage-earners combined exceeded \$2.10 per day are California, Colorado, Oregon, and Rhode Island. In eleven of the states named in the table the median group for all employees was \$2 to \$2.04, and these states include several of the most im-

portant. The median for all wage-earners was below \$1.50 in Alabama, Arkansas, Georgia, North Carolina, and Tennessee.

The median rate of wages for conductors, which corresponded closely with that for motormen, was \$2 to \$2.04 in several of the leading states. Only in California, Colorado, Illinois, Michigan, Montana, Oregon, and Rhode Island was the median above this figure. In five Southern states the median for conductors was below \$1.50 per day. For road and track men several states have a median of \$1.50 to \$1.54. Of the states

in which the wages of road and track men were comparatively high, the most important are California, Colorado, Massachusetts, Minnesota, Montana, New York, Oregon, Utah, Washington, and Wisconsin. The median for this class of wage-earners was less than \$1 per day in four Southern states, where negro labor is largely employed.

Classified wages for fast interurban railways.—The following table presents classified wage statistics for leading classes of employees on fast, long interurban railways, by states:

TABLE 77.—DISTRIBUTION OF WAGE-EARNERS OF FAST, LONG INTERURBAN RAILWAYS, ACCORDING TO DAILY WAGES RECEIVED: 1902.

	Total.	Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.	\$3.00 and over.	Median rate (dollars).
All classes.....	6,836	8	51	666	1,567	1,354	2,491	370	178	43	108	1.90 to 1.94
Conductors.....	1,849		16	59	239	467	990	77		1		2.00 to 2.04
Motormen.....	1,931		16	97	227	490	1,007	93		1		2.00 to 2.04
Road and track men.....	1,131		3	428	586	77	10	19	2	1	5	1.50 to 1.54
Engineers.....	190			1	5	13	48	20	52	12	39	2.50 to 2.54
Firemen.....	208		1	8	92	63	39	3			2	1.75 to 1.79
Mechanics.....	535	7	4	19	128	94	161	66	31	9	16	2.00 to 2.04
All other classes.....	992	1	11	54	290	150	236	92	93	19	46	1.85 to 1.89
All classes by states:												
United States.....	6,836	8	51	666	1,567	1,354	2,491	370	178	43	108	1.90 to 1.94
Illinois.....	446			56	60	56	212	17	25	6	14	2.00 to 2.04
Indiana.....	901	2	4	162	267	248	165	27	18	1	7	1.75 to 1.79
Michigan.....	1,933	6	6	81	365	159	1,184	115	27	10	30	2.10 to 2.14
New York.....	671			170	139	140	128	42	27	4	21	1.75 to 1.79
Ohio.....	2,358		35	128	667	581	707	129	70	15	26	1.90 to 1.94
All other states.....	527		6	119	69	170	95	40	11	7	10	1.80 to 1.84
Conductors by states:												
United States.....	1,849		16	59	239	467	990	77		1		2.00 to 2.04
Illinois.....	139			25	12	7	95					2.00 to 2.04
Indiana.....	197				34	89	74					1.95 to 1.99
Michigan.....	583				43	5	518	17				2.10 to 2.14
New York.....	186				25	63	80	18				1.80 to 1.84
Ohio.....	683		16	29	115	233	255	84		1		1.90 to 1.94
All other states.....	111			5	10	70	18	8				1.80 to 1.84

It will be seen that the median wage for all employees of the fast, long interurban railways is \$1.90 to \$1.94, or somewhat less than the median for all classes of railways combined. The median rate for conductors and motormen on such interurban railways, however, is \$2.00 to \$2.04, the same as in cities of more than 100,000 inhabitants; and the general distribution of wage rates for these two classes of employees is nearly the same as in the cities of more than 100,000 inhabitants. The work of conductors and motormen on fast, long interurban railways is somewhat different in character from that of similar classes of employees in cities. On account of the high speed maintained by their cars their positions are, in some respects, more difficult and

responsible. Signals and telephone dispatches directing the movements of cars must be carefully attended to. On the other hand, the freedom from crowded streets relieves the motorman, and to a less extent the conductor, on the fast interurban cars from some of the continuous strain that is felt by the city employee. Many of the employees of interurban railways live in small towns and have the benefit of the fact that the cost of living is less than in the cities. Perhaps it may be concluded that the advantages of the employees of interurban railways, as compared with those on railways in the largest cities, are about offset by the disadvantages, as is indicated by the comparative wages.

CHAPTER VII.

INTERURBAN RAILWAYS—ECONOMIC, FINANCIAL, AND SOCIAL FEATURES.

I.

GENERAL DEVELOPMENT AND EXTENT.

Difficulties of definition and classification.—The conditions of business of the typical modern interurban railway differ so greatly from those of the ordinary street railway as to require special discussion. This subject has a peculiar interest because of the fact that the interurban business is of recent development, most of the faster and longer lines having been constructed within the past five years. The changes now taking place are so rapid that the census statistics covering the year ending June 30, 1902, will soon be out of date. Many new interurban railways were indeed under construction during the census year.

As already indicated (see page 5), many of the railways combine urban with interurban characteristics and traffic in such a way as to make attempts to classify them unsatisfactory. Such railways in their returns made no distinction between their strictly urban business and their interurban and suburban business, and in every case they have necessarily been treated as a unit and classed either as urban or interurban. In making this classification, therefore, it has been necessary to adopt more or less arbitrary rules. It will be recalled that the general rule followed in this respect has been to consider as interurban any railway which has more than one-half of its trackage outside the limits of incorporated municipalities; and to consider as a "fast, long" interurban any railway more than 15 miles in length, which has two-thirds or more of its trackage outside the limits of municipalities and which operates cars at a maximum speed of 20 miles or more per hour. On the basis of these rules, various companies have been classed as interurban the urban traffic of which might perhaps be found, if the information were at hand, to exceed somewhat their interurban traffic. The railways classed as "other" interurban railways are, however, much more heterogeneous in character than the "fast, long" interurbans, though even among the latter there are several which have a considerable amount of strictly urban traffic.

On account of its extensive urban traffic the Detroit United Railways Company, which operates some of the most progressive interurban lines, has been classed necessarily with the miscellaneous group rather than with the group of typical fast interurban railways.

It would be interesting, if possible, to distinguish more specific classes among the interurban railways. For instance, a distinction might be drawn between interurban lines proper and suburban lines, between companies which do a considerable proportion of their business within the limits of cities and those which do only a small proportion within such limits; and between lines which depend largely upon seasonal traffic and those which have traffic fairly well distributed throughout the year. The different railways grade into one another so imperceptibly in these respects, however, that, in the absence of more detailed information regarding the nature of the business of each company, such classification has been deemed impracticable, and it has been found necessary to group together all interurban railways except those of the special class of fast, long lines above defined.

Statistics of trackage outside the limits of incorporated cities and towns.—Because of the necessary imperfection of the classification of interurban lines adopted in the tables and general discussion, it is worth while, in order to get another view regarding the development of interurban railways, to consider the statistics of Table 94, which shows the amount of trackage lying outside the limits of incorporated cities and towns. This distinction is also an imperfect one, for the reasons that the limits of an incorporated place are often not identical with the limits of the area of dense population, and that there are many essentially urban communities, especially in New England, which are not incorporated. In order to avoid the second of these difficulties, some of the railway companies, in reporting their statistics of trackage, adopted more or less arbitrary limits to distinguish urban from rural districts in unincorporated places. In Massachusetts, however, where so many essentially urban communities are not politically separated from the unincorporated towns in which they lie, a large proportion of the companies were unable to make a satisfactory classification of their trackage, and the statistics of urban and nonurban trackage for the entire state have therefore been omitted in making up the totals for the country.

Despite these qualifications, however, the statistics of trackage lying outside the limits of incorporated places or other essentially urban communities, as shown in Table 94, undoubtedly show fairly well the amount of track which is extraurban, and thus throw an interest-

ing light on the extent to which suburban and interurban railways have been developed. Out of a total trackage of 20,063.82 miles exclusive of Massachusetts, 6,855.58 miles, or 34 per cent, were reported as lying outside municipal limits or the limits of urban communities as determined by certain companies. This item obviously has no direct relation to that of the total trackage of those railway companies which the Bureau of the Census has classed as interurban, although it so happens that the two are nearly the same.

An approximate indication as to the relative extent of interurban railways in the several states may also be gained from the figures for trackage without municipal limits in Table 94. For the reason just indicated, the returns from the New England states are less exact than those from the other parts of the country.

The states which have the largest amount of electric railway mileage outside of municipal limits are Connecticut, with 338.83 miles, or about three-fifths of the total trackage in this state;¹ Indiana, with 278.34 miles, or 43 per cent of the total trackage; Maine, with approximately 200 miles, or about three-fifths of the total; Massachusetts, with probably two-thirds of the total of 2,525.65 miles extraurban (exact figures not available); Michigan, with 558.62 miles, or 54.6 per cent; New Hampshire, with 85.99 miles, or 51.3 per cent; Ohio, with 1,278.55 miles, or 54.3 per cent; Pennsylvania, with 1,113.54 miles, or 44.9 per cent; and Virginia, with 197.89 miles, or 55.1 per cent. New York and Illinois have also large absolute amounts of electric railway trackage outside of municipal limits, but their urban railways are so extensive that the proportion of the total trackage which lies outside of municipal limits is comparatively small.

Leading centers of interurban railway development.—The conditions which favor the development of interurban railways may be considered from the standpoint of amount of traffic and from that of cost of service. From the standpoint of traffic the favoring conditions are (1) a comparatively dense population, arising from many and populous towns and villages; (2) connection with a large city, which attracts travel from the smaller towns and rural districts, and from which also summer traffic may be carried to resorts and rural districts; (3) general material prosperity and intelligence. From the standpoint of cost the important consideration is that the territory to be served shall be comparatively level, and otherwise free from physical obstacles to economical construction and operation.

It will be found by detailed study of the existing interurban railways that in sections where they are most conspicuously developed several or all of these conditions are present.

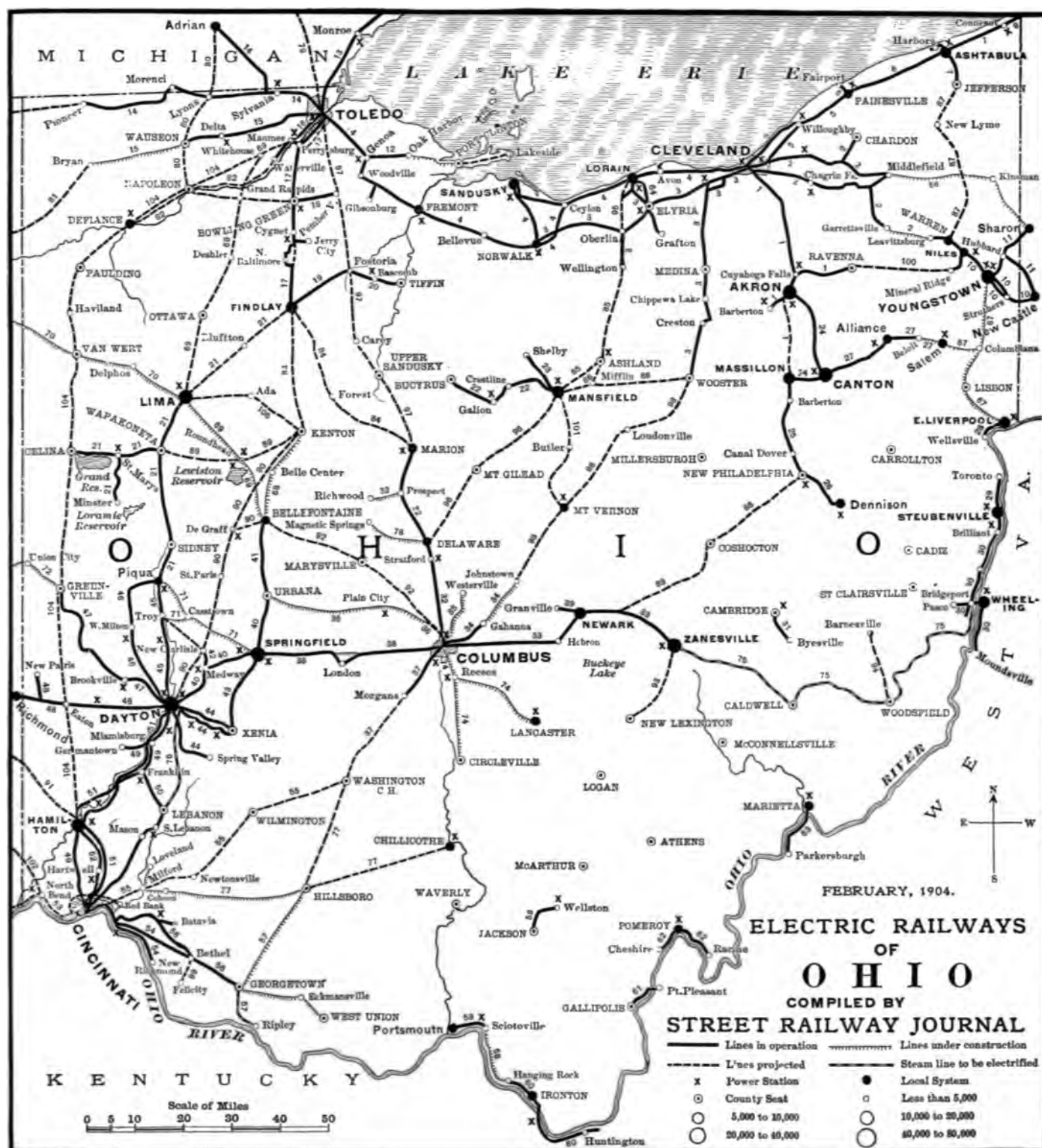
In proportion to its area, Massachusetts has much more electric railway mileage than any other state.

¹ The Connecticut figures, however, are not exact, as several companies failed to make the distinction.

The 2,525.65 miles of electric road in that state represent on an average about one-third of a mile of track for each square mile of area. Except for the Boston system, nearly all the railway companies in this state are classed as interurban, according to the rules adopted by the Bureau of the Census; although several of those which are so classed, because more than half of their trackage lies in essentially rural districts, probably carry more than half of their passengers within urban communities. The cities of Massachusetts lie so near together that it was a natural process for the street railways already existing in them to reach out and become united, and then to extend to the many prosperous villages in the vicinity. The agricultural population of Massachusetts, however, is comparatively sparse and has not contributed materially to the patronage of the electric railways. It is now possible to traverse the whole length and breadth of this state on trolley cars or to go from any important town to almost any other in this way. The cars operated on the interurban lines in Massachusetts are for the most part similar in size, motive power, and speed to those used in the cities. Table 97 shows that a large majority of the interurban companies of the state reported a maximum speed outside municipal limits of not more than 15 miles per hour. There is, however, an increasing tendency in Massachusetts, as elsewhere, toward the adoption of improved methods of interurban service, and several companies now operate cars which attain a maximum speed of from 25 to 35 miles per hour.

What is true of the interurban railways in Massachusetts is largely true also of those in Connecticut and Rhode Island, and of those in the more densely populated parts of New Hampshire and Maine, particularly along the coast where summer traffic is an important element. Pennsylvania is another state in which there has been extensive interurban development, but in which many railways show no sharp distinction between urban and interurban business. The rich agricultural and manufacturing regions in the east and southeast, the anthracite mining regions in the northeast, and the densely populated valleys of the western part of the state are the chief centers of interurban railway development. A few of the lines in Pennsylvania are equipped for heavy traffic at high speed. In New York interurban electric railways are found chiefly in the upper Hudson valley, in the Mohawk valley, and in the vicinity of Buffalo. High-speed electric cars now operate from Hudson to Albany, and from Albany north through Saratoga and Glens Falls to Warrensburg, a total distance of nearly 150 miles. Plans are on foot, which will probably soon be realized, to connect the existing interurban lines running out from the large cities in the middle of this state into a chain reaching from Albany to Buffalo.

The Central states, Ohio, Michigan, Indiana, and Illinois, possess the most extensive and efficient high-



speed interurban railways in the country, and illustrate most clearly the future possibilities of this method of transportation. They cover all the circumstances already mentioned which contribute to favor the development of such railways. In these states a clear distinction usually appears between urban and interurban lines, and, as a rule, the two classes of railways are controlled by different organizations. The fast interurban railways of these states are running more and more to compete with steam railways for passenger traffic, even for trips of considerable length. The electric lines have been and are still being constructed with a view to ultimate communication and extensive systems. While the lines have usually been built only where the local business need was expected to prove profitable, the possibilities of through service have always been kept in mind. Already, in several places, the meeting of such shorter electric lines has made it possible to make long journeys by electric cars, in some cases without the necessity of change. Combination of detached lines into systems is being found, as was the case with steam railways, to bring many advantages to the public in the way of through cars and well-adjusted schedules, as well as to the owners in the way of economical operation.

By the courtesy of the Street Railway Journal, a map showing the electric railways of Ohio—as completed, under construction, and projected—is here presented.

The southern shore of Lake Erie is skirted by electric lines from the northeast corner of Ohio to Toledo, and a line which was under construction during the census year now connects Toledo with Detroit. The system from Cleveland to Toledo, which is now controlled by the consolidated Lake Shore Electric Railway Company, has 135 miles of main track. From Cleveland several other important electric railways radiate to the southeast, south, and southwest for distances of 50 miles or more, and it is expected that these lines will soon be extended to Pittsburg and Columbus. A group of four connecting trolley roads reaches from Toledo, through Findlay, Lima, Dayton, and Hamilton, to Cincinnati. The two longest links of this chain are controlled by a single syndicate, and it is probably only a question of time when the others will fall into the same hands.

Another important group of railways controlled by a single syndicate extends from Columbus to Springfield and Dayton, and is expected soon to reach Cincinnati, and, by connections with other roads, Toledo also. A steam railway between Wheeling, W. Va., and Zanesville, Ohio, is now being equipped for electric operation, and when this is completed a chain of electric railways will extend from Wheeling, W. Va., through Columbus and Dayton, to Indianapolis, a distance of about 365 miles.

The railways radiating from Detroit are likewise extensive and highly efficient in organization and operation. One line reaches west to Jackson, another northwest

to Flint, and a third extends northwest to Port Huron, carrying Lake St. Clair. Each of these lines is more than 50 miles long, and with their interconnecting branches they make an extensive system. Another railway runs from Jackson was opened in 1903, and this connects at Battle Creek with a line reaching nearly across the state. Probably within a short time connections will be made with Grand Rapids and with the two systems which extend from there to Lake Michigan.

Indiana rivals Ohio in the extent of its interurban railways. The map herewith presented, also prepared by the Street Railway Journal, shows the lines that were open, under construction, and projected at the close of 1903.

It will be seen that no less than nine interurban lines radiate from Indianapolis and that three others are under construction. Some of these lines run 50 miles or more. Perhaps the most extensive interurban railway system in the country is that of the Elkhart Traction Company, which extends northeast from Indianapolis to Muncie and Marion and north to Kokomo and Logansport. Additional lines connecting the present systems by direct routes with Chicago, Toledo, Cincinnati, and St. Louis are projected.

Several important electric railways also radiate from Chicago. One of these, the Aurora, Elgin and Chicago, which uses the third-rail system, is conspicuous for its heavy construction and its high speeds. Considerable progress has also been made in the construction of fast, long electric railways in eastern Wisconsin, in parts of Iowa, in eastern Missouri in the vicinity of St. Louis, in the neighborhood of Los Angeles, Cal., and elsewhere.

II.

TRAFFIC AND EARNINGS OF INTERURBAN RAILWAYS.

Because of differences in the length of journeys on the longer interurban railways, there is much less significance in the statistics of the number of passengers carried and the relation of that number to trackage and car mileage than in the case of urban railways. Few, if any, interurban railways have as yet adopted the practice of steam railways in recording the distances traveled by passengers. The results of operation of fast, long interurban lines can, therefore, be satisfactorily studied only through financial data. Financial statistics can not be presented for companies by name. However, averages or totals for states or for the country as a whole, such as have been presented in the tables of Part I, Chapter V, correspond so little with the actual conditions on many individual railways that it has been considered desirable to present certain financial data for specific companies, omitting the names and other means of identification. Table 78 includes 33 of the fast, long interurban lines that reported financial data. The companies with commercial lighting, and those in operation only part of the census year, are distinguished

speed interurban railways in the country, and illustrate most clearly the future possibilities of this method of transportation. Here coexist all the circumstances already mentioned which contribute to favor the development of such railways. In these states a clear distinction usually appears between urban and interurban lines, and, as a rule, the two classes of railways are controlled by different corporations. The fast interurban railways of these states are tending more and more to compete with steam railways for passenger traffic, even for rides of considerable length. The electric lines have been and are still being constructed with a view to ultimate combination into extensive systems. While the links have usually been built only where the local business itself was expected to prove profitable, the possibilities of through service have always been kept in mind. Already, in several places, the meeting of such shorter electric lines has made it possible to take long journeys by electric cars, in some cases without the necessity of change. Combination of detached lines into systems is being found, as was the case with steam railways, to bring many advantages to the public in the way of through cars and well-adjusted schedules, as well as to the owners in the way of economical operation.

By the courtesy of the Street Railway Journal, a map showing the electric railways of Ohio—as completed, under construction, and projected—is here presented.

The southern shore of Lake Erie is skirted by electric lines from the northeast corner of Ohio to Toledo, and a line which was under construction during the census year now connects Toledo with Detroit. The system from Cleveland to Toledo, which is now controlled by the consolidated Lake Shore Electric Railway Company, has 155 miles of main track. From Cleveland several other important electric railways radiate to the southeast, south, and southwest for distances of 50 miles or more, and it is expected that these lines will soon be extended to Pittsburg and Columbus. A group of four connecting trolley roads reaches from Toledo, through Findlay, Lima, Dayton, and Hamilton, to Cincinnati. The two longest links of this chain are controlled by a single syndicate, and it is probably only a question of time when the others will fall into the same hands.

Another important group of railways controlled by a single syndicate extends from Columbus to Springfield and Dayton, and is expected soon to reach Cincinnati, and, by connections with other roads, Toledo also. A steam railway between Wheeling, W. Va., and Zanesville, Ohio, is now being equipped for electric operation, and when this is completed a chain of electric railways will extend from Wheeling, W. Va., through Columbus and Dayton, to Indianapolis, a distance of about 365 miles.

The railways radiating from Detroit are likewise extensive and highly efficient in organization and operation. One line reaches west to Jackson, another northwest

to Flint, and a third extends northeast to Port Huron, skirting Lake St. Clair. Each of these lines is more than 75 miles long, and with their interlacing branches they make an elaborate system. Another railway west from Jackson was opened in 1903, and this connects at Battle Creek with a line reaching nearly across the state. Probably within a short time connections will be made with Grand Rapids and with the two systems which extend from there to Lake Michigan.

Indiana rivals Ohio in the extent of its interurban railways. The map herewith presented, also prepared by the Street Railway Journal, shows the lines that were open, under construction, and projected at the close of 1903.

It will be seen that no less than nine interurban lines radiate from Indianapolis, and that three others are under construction. Some of these lines run 75 miles or more. Perhaps the most extensive interurban railway system in the country is that of the Union Traction Company, which extends northeast from Indianapolis to Muncie and Marion and north to Kokomo and Logansport. Additional lines connecting the present systems by direct routes with Chicago, Toledo, Cincinnati, and St. Louis are projected.

Several important electric railways also radiate from Chicago. One of these, the Aurora, Elgin and Chicago, which uses the third-rail system, is conspicuous for its heavy construction and its high speeds. Considerable progress has also been made in the construction of fast, long electric railways in eastern Wisconsin, in parts of Iowa, in eastern Missouri in the vicinity of St. Louis, in the neighborhood of Los Angeles, Cal., and elsewhere.

II.

TRAFFIC AND EARNINGS OF INTERURBAN RAILWAYS.

Because of differences in the length of journeys on the longer interurban railways, there is much less significance in the statistics of the number of passengers carried and the relation of that number to trackage and car mileage than in the case of urban railways. Few, if any, interurban railways have as yet adopted the practice of steam railways in recording the distances traveled by passengers. The results of operation of fast, long interurban lines can, therefore, be satisfactorily studied only through financial data. Financial statistics can not be presented for companies by name. However, averages or totals for states or for the country as a whole, such as have been presented in the tables of Part I, Chapter V, correspond so little with the actual conditions on many individual railways that it has been considered desirable to present certain financial data for specific companies, omitting the names and other means of identification. Table 78 includes 53 of the fast, long interurban lines that reported financial data. The companies with commercial lighting, and those in operation only part of the census year, are distinguished

from the other companies. It should be noted that two or three companies of the larger group did not have all of their trackage in operation during the whole of the census year, but inasmuch as the companies themselves were in operation during the entire year, they have been included in the group of full-time lines. The table shows, per mile of track, the total operating earnings, earnings from strictly railway business (i. e., from passengers, chartered cars, freight, mail, and express), passenger earnings, and combined freight, mail, and express earnings, all of these ratios being based on the total trackage operated, including that under trackage rights. Earnings from the sale of current for light and power, or from miscellaneous sources, do not

appear as a separate item, but are equal to the difference between the first column and the second. The table presents likewise the total railway earnings per mile run by cars of all classes, and the total passenger earnings per passenger-car mile. It is impracticable to present the statistics of earnings from freight, mail, and express business per mile operated by cars devoted exclusively to this business, because of the character of the reports on this point, and because of the frequent practice of handling such traffic in passenger cars. Finally, the table indicates the total amount of operating expenses per car mile for all classes of cars, and the ratio of total operating expenses to total operating earnings.

TABLE 78.—GENERAL RESULTS OF OPERATION OF 53 FAST, LONG INTERURBAN RAILWAY COMPANIES: 1902.

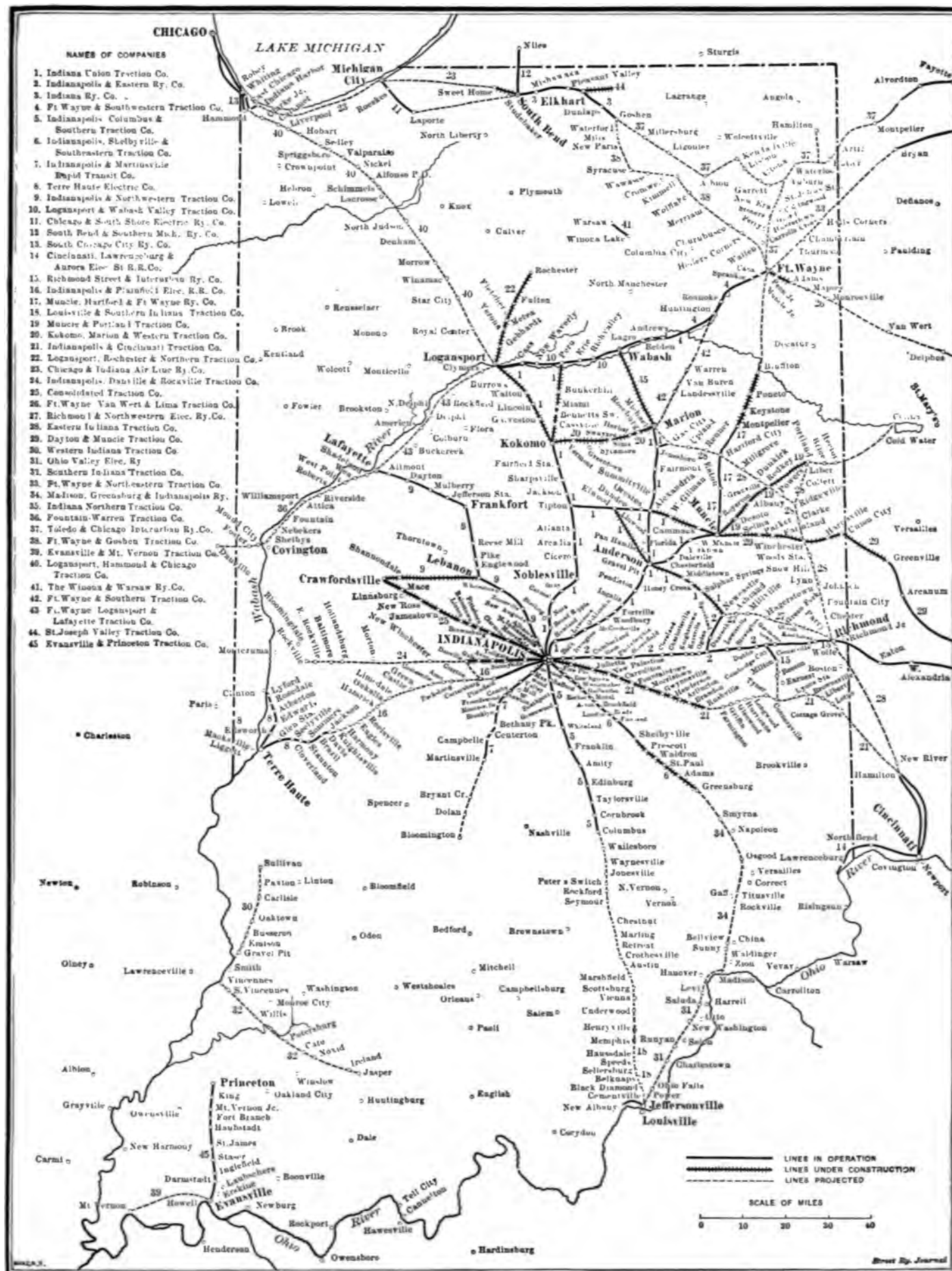
CLASS.	EARNINGS PER MILE OF TRACK.				Railway earnings proper per car mile.	Passenger earnings per passenger car mile.	Operating expenses per car mile.	Percentage of operating expenses to operating earnings.	CLASS.	EARNINGS PER MILE OF TRACK.				Railway earnings proper per car mile.	Passenger earnings per passenger car mile.	Operating expenses per car mile.	Percentage of operating expenses to operating earnings.
	Total.	From railway operation proper.								Total.	From railway operation proper.						
		Total.	From passengers.	From freight, mail, and express.							Total.	From passengers.	From freight, mail, and express.				
Full-time railways without commercial lighting: Average for all companies...	\$3,308	\$3,217	\$3,032	\$185	\$0.201	\$0.197	\$0.124	59.9	Full-time railways without commercial lighting—Continued. Average for all companies...	\$5,908	\$5,815	\$5,766	\$49	\$0.275	\$0.275	\$0.186	66.5
Individual companies...	4,153	4,060	3,968	92	.159	.155	.069	42.4	Individual companies...	6,603	6,581	6,352	229	.249	.243	.127	51.3
	3,566	3,542	3,537	5	.165	.165	.095	57.2		4,125	4,089	3,513	576	.289	.280	.138	47.4
	4,148	4,138	4,037	101	.205	.207	.125	61.2		5,649	5,460	5,408	52	.208	.207	.121	56.4
	3,091	3,091	2,848	243	.237	.235	.146	61.7		1,625	1,508	1,504	4	.133	.133	.168	116.7
	5,582	5,541	5,393	148	.203	.202	.147	72.1		2,221	2,131	1,739	392	.230	.229	.198	68.1
	5,754	5,680	5,580	100	.220	.220	.119	53.5		1,937	1,900	1,790	110	.238	.224	.145	60.0
	1,589	1,480	1,480	.....	.084	.084	.092	103.1		1,968	1,937	1,937	.....	.120	.120	.091	74.7
	3,052	2,895	2,892	3	.182	.185	.133	69.3									
	3,955	3,936	3,764	172	.189	.181	.094	49.6									
	3,054	3,030	2,575	455	.223	.197	.125	55.7									
	3,495	3,434	3,151	283	.197	.193	.098	48.5	Full-time railways with commercial lighting: Average for all companies...	5,815	4,572	4,416	156	.206	.203	.153	58.4
	2,069	2,069	1,870	199	.166	.179	.121	73.2	Individual companies...	6,060	5,176	5,142	34	.189	.188	.128	55.5
	3,412	3,410	3,149	261	.235	.236	.179	76.3		4,752	3,673	2,778	895	.242	.201	.246	74.1
	2,664	2,379	2,354	25	.193	.209	.137	63.5		9,900	6,828	6,753	75	.259	.261	.261	69.6
	2,265	2,264	1,959	305	.273	.262	.202	74.0		5,463	4,689	4,581	108	.178	.180	.100	48.3
	3,815	3,730	3,711	19	.202	.201	.176	85.0		3,827	2,692	2,681	11	.257	.256	.197	54.1
	2,371	2,367	2,294	73	.242	.234	.127	52.3									
	676	658	658	.....	.144	.144	.127	85.5	Part-time railways: Average for all companies...	2,016	1,936	1,864	72	.212	.218	.137	61.9
	5,405	3,363	3,357	6	.113	.113	.109	60.0	Individual companies...	4,032	3,881	3,838	43	.214	.217	.139	62.6
	5,384	5,324	5,250	74	.192	.196	.100	51.7		2,084	2,024	1,989	35	.203	.199	.115	55.3
	2,872	2,872	2,872	.....	.180	.180	.080	44.4		1,207	1,204	1,157	47	.190	.210	.111	58.4
	3,258	3,207	3,037	170	.207	.206	.120	56.9		914	912	902	10	.295	.292	.286	96.7
	1,842	1,826	1,183	643	.267	.173	.181	66.9		1,931	1,921	1,787	164	.160	.161	.101	63.1
	4,624	4,373	4,111	262	.243	.228	.144	56.0		935	735	735	.....	.235	.235	.197	66.0
	1,357	1,357	1,357	.....	.403	.424	.268	66.5		1,257	1,204	1,204	.....	.281	.281	.097	33.2
	3,498	3,498	3,261	237	(1)	(1)	(1)	56.1		2,731	2,557	2,365	192	.265	.245	.195	68.7
	2,275	2,265	2,152	113	.141	.142	.080	56.8									
	1,743	1,743	1,697	46	.190	.185	.201	105.7									
	3,799	3,754	3,677	77	.233	.229	.092	39.1									
	1,383	1,358	892	466	.239	.208	.148	61.0									
	2,409	2,351	2,199	152	.176	.174	.118	65.3									
	2,854	2,827	2,814	13	.171	.199	.132	76.3									

¹ Car mileage not reported.

Earnings per mile of track.—Confining attention to full-time companies without commercial lighting plants, the average earnings from all sources per mile of track for all companies are \$3,308, of which \$3,032 is derived from passengers and \$185 from freight, mail, and express. Of the 40 companies in this class 9 earn less than \$2,000 per mile of track. At least 6 of these, however, did not have all their trackage in operation throughout the whole census year. Nine companies earned from \$2,000 to \$3,000 per mile of track; 11, the largest group, from \$3,000 to \$4,000; 4 from \$4,000 to \$5,000; and 7 more than \$5,000 per mile. While some

of the companies with high earnings per mile of track derived a considerable part of their revenue from passengers carried within the limits of cities, others that earned \$4,000 or more per mile derived much the greater part of their earnings from strictly interurban business.

Nearly all of the earnings of the first group of railways shown in the table are from strictly railway business. The 5 companies that operate lighting plants, the second group in the table, have a considerable revenue from that branch of the business, but their railway earnings proper are larger per mile of



ELECTRIC RAILWAYS OF INDIANA.

track than those of most of the companies without lighting plants. Two or three of the 5 companies do an important urban as well as interurban business. The earnings per mile of track of companies operating during only part of the year vary greatly because of the difference in the length of time that they were operated.

The freight, mail, and express business of the interurban railways shows such widely differing stages of development that an average for all companies is not significant. Eight of the 53 companies shown in the table have earnings from these sources equal to more than one-tenth of their earnings from passengers, and of these 8 companies 3 have freight, mail, and express earnings equal to more than one-third of their revenue from passengers. All of the 4 companies in Michigan operating the entire year do an important freight and express business, and the same is true of the interurban lines of the Detroit United Railway Company, which is not included in the table. Among other companies whose freight and express business is important may be mentioned the Indianapolis and Eastern Railway Company, the Eastern Ohio Traction Company (Cleveland to Garrettsville, etc.), the Cleveland, Painesville and Eastern Railroad Company, the Dayton, Springfield and Urbana Electric Railway Company, the Toledo and Western Railway Company (Toledo to Adrian, Mich.), the Mahoning Valley Railway Company (Youngstown, Ohio, to Newcastle, Pa.), the Los Angeles Pacific Railroad Company, the Erie Traction Company (Erie to Cambridge Springs, Pa.), and the Albany and Hudson Railway and Power Company.

Earnings per car mile.—The ratio of earnings to car mileage on interurban railways is much more nearly uniform than the ratio of earnings to trackage. Moreover, this figure furnishes a basis for comparison of the financial operations of part-time and full-time roads which the ratio of earnings to trackage did not permit. The total railway earnings of the three groups of interurban companies in Table 78 are equal to 20.6 cents per car mile and the passenger earnings are equal to 20.3 cents per car mile. No great difference appears in these ratios as among the three groups of companies. Of the 52 companies for which car mileage was reported, 6 have railway earnings of less than 15 cents per car mile, 16 have earnings of from 15 to 20 cents, 19 from 20 to 25 cents, 10 from 25 to 30 cents, and 1 more than 40 cents per car mile.

Operating expenses.—The operating expenses per car mile for full-time interurban railways without commercial lighting average 12.4 cents, and those for companies operating only part of the year, most of which do not furnish commercial lighting, 13.7 cents. Some of the companies report remarkably low ratios of operating expenses, 10 showing less than 10 cents per car mile. Only 9 of the full-time companies without commercial lighting have operating expenses exceeding 15 cents per car mile, and several of these cases are easily ex-

plained by temporary or exceptional causes. The total operating expenses of companies which do an extensive lighting business are naturally relatively high per car mile.

The average ratio of operating expenses to operating earnings for the 53 fast, long interurban railways in Table 78 is 59.8 per cent. For full-time companies without commercial lighting the ratio of expenses to earnings is 59.9 per cent. Much the greater proportion of the companies have operating ratios between 50 and 70 per cent, but 8 report a ratio of less than 50 per cent and 13 a ratio exceeding 70 per cent. The financial results of interurban railway business must be considered on the whole very satisfactory.

Growth of traffic.—Several interurban companies, in response to the request of the Bureau of the Census for additional information, presented statistical comparisons showing the growth of their earnings. None of the companies has been in operation more than a few years, but in several instances a marked increase of earnings has taken place within that time. Thus the Eastern Ohio Traction Company states that its passenger earnings were 24 per cent greater in 1902 than in 1901. The Detroit, Ypsilanti, Ann Arbor and Jackson Railway in 1901 had, with the same trackage, about 20 per cent more passenger earnings in 1901 than in 1898. Much more remarkable has been the growth of freight traffic on some of the lines. The report of the railway last mentioned shows that freight earnings are increasing by from 20 to 30 per cent each year. The Schenectady Railway (Schenectady to Albany, N. Y.), during the twelve months from July 1, 1902, to June 30, 1903, earned about three and one-half times as much from freight and express as during the six months immediately preceding.

Relation between earnings and population served by fast, long interurban railways.—Much interest attaches to the question of the relation between the amount of earnings on interurban railways and the population served. Only rough approximations can be made on this subject. Conditions peculiar to each railway make it impossible to draw from its experiences definite conclusions that can be regarded as typical. The greatest difficulty is found in determining the extent of the population which is to be considered as tributary to a given railway.

For example, where an interurban railway connects a group of small towns with a large city, the resident population of the small towns usually furnishes much more traffic in the aggregate than the resident population of the city, although the inhabitants of the city may greatly outnumber those of all the other towns. The latter contributes some traffic, but it would be obviously improper to combine the population of the large city with that of the small towns in calculating the per capita traffic. Where two large cities are connected by an electric railway, which also serves inter-

mediate towns, the traffic furnished by the cities is likely to be somewhat greater than where only a single city is served. The amount of traffic will depend largely upon the distance between the two cities and the comparative speed and charges of the electric and steam service. But even where two cities are connected in this manner it would likewise be improper to count the population of the cities in the same way as that of the smaller towns in determining the relation of traffic to population. In other cases interurban railways connect only towns of medium or small size. There is ordinarily less to attract travel on such a railway, and the ratio between earnings and population served may be expected to be lower than the ratio in the case of railways connecting with large cities.

It is quite impossible from the available statistics of population to determine the number of the inhabitants of rural communities who can be considered as tributary to an interurban railway. Ordinarily the township, which is the unit for reporting the population, is of such large area that only a small portion of its inhabitants have access to a railway running through it. In some cases, to be sure, interurban lines draw a considerable proportion of their traffic from the farming class. Usually, however, much the greater part of the traffic is furnished by the inhabitants of towns.

Table 79 shows the relation between operating earnings and population for 16 selected fast, long interurban railways. The population is that of the census of 1900, while the operating earnings are for the census year 1902. The population taken as a basis in each case includes only incorporated places, and does not include large cities serving as termini, which are for convenience designated as "city termini." Of the railways under consideration 8 are in Ohio, 5 in Michigan, and 1 each in Indiana, Illinois, and Missouri.

TABLE 79.—*Relation of trackage and operating earnings to population served in the case of selected fast, long interurban railways: 1902.*

NUMBER OF COMPANY.	Population of incorporated places, not including city termini, per mile of track operated.	Annual operating earnings per inhabitant served.	NUMBER OF COMPANY.	Population of incorporated places, not including city termini, per mile of track operated.	Annual operating earnings per inhabitant served.
1.....	493	\$6.61	9.....	816	\$4.29
2.....	259	¹ 11.80	10.....	181	9.66
3.....	558	6.39	11.....	350	6.89
4.....	278	14.20	12.....	557	9.66
5.....	494	² 7.74	13.....	1,009	3.98
6.....	570	6.13	14.....	1,618	3.49
7.....	230	14.83	15.....	2,044	2.89
8.....	270	8.96	16.....	696	1.73

¹ Freight earnings more than one-seventh of total.

² Operates a lighting plant.

The first 10 railways referred to in the table all connect towns of small or medium size with a single large city, Dayton, Ohio, with a population of 85,333, being

the smallest "city terminus" in the group. Number 1 serves 8 towns of between 1,000 and 20,000 inhabitants, with a total population of nearly 40,000. The largest town served has also another important interurban railway connection. Number 2 serves 5 small towns and 1 of about 20,000 inhabitants, situated at one end of the line. The total population of these towns is between 30,000 and 40,000. Number 3 connects 1 large town and 4 towns of less than 3,000 inhabitants each with a city, the total population of the 5 towns being about 35,000. Number 4 connects 4 small towns with a large city, the aggregate population of these towns being less than 8,000. Presumably, a considerable amount of traffic is in this last case furnished by rural communities, while some may possibly come from beyond the terminus of the railway. Number 5 has as one of its termini a town of more than 15,000 people, and serves 4 intermediate places of smaller size, the total population of these 5 towns being between 25,000 and 30,000. Number 6 serves 3 towns of considerable size and 5 smaller towns, their combined population being more than 50,000. The town population directly served by number 7 is very small, and it probably carries a considerable number of passengers to a connection with the steam railroad at its terminus. Number 8 connects 3 small towns with a large city. Number 9 serves 1 city of more than 30,000 people and 2 or 3 smaller towns, the total population served being more than 40,000; the larger town mentioned has also electric railway connections in other directions. Number 10 serves less than 10,000 people directly, these being mostly confined to the town at its terminus. Presumably, a considerable amount of traffic is due to steam railroad connections.

Numbers 11 and 12 each connect 2 large cities at considerable distances from one another. Probably, however, much the greater part of the traffic is furnished by the intermediate towns, which, in the one case have an aggregate population of more than 40,000 and in the other case of more than 60,000.

Numbers 13, 14, and 15 do not reach large cities, but in each case have as their termini medium-sized towns with population ranging from 10,000 to 45,000. They are all lines of considerable length and serve 2 or more minor towns in addition to their termini. Number 16 connects 4 towns of between 5,000 and 25,000 population, and also serves several smaller places. It will be observed that, as might be expected, the ratio of traffic to population is lower in the case of the last 4 railways than in most of the other cases. The "city terminus" has a strong tendency to attract travel on the part of the inhabitants of the neighboring smaller towns.

Most of the railways covered by Table 79 are highly prosperous. More than half of them report a ratio of operating expenses to earnings below 60 per cent, and only 3 have a ratio exceeding 75 per cent.

III.

CHARACTERISTICS AND SIGNIFICANCE OF INTERURBAN SERVICE.

In discussing the broader questions regarding the social and economic significance of interurban railway traffic, it is difficult to avoid entrance into the domain of prophecy. Some of the electric railways have already made such progress in methods that certain prophets look forward to the complete superseding of steam traction by electric traction. However this may be, it is evident that, even if the electric railways confine themselves to the methods already widely prevalent, they are bound to become a social and economic factor of enormous importance. Remarkable benefits have

already been realized from the existing interurban lines, and the extension of such railways to a large proportion of our more prosperous communities seems but a matter of a short time.

As a means of studying more specifically the nature of the traffic of modern fast interurban railways, the Bureau of the Census addressed a special schedule of inquiries to a number of typical lines, most, but not all, of which are of the class designated as fast, long lines. Below is presented a tabulation, for individual companies, of the replies received, so far as they relate to traffic. Several of the railways enumerated are thoroughly typical modern interurban railways. The blanks represent in most cases inability or failure of the company to furnish the desired information.

STREET AND ELECTRIC RAILWAYS.

Traffic of selected

[Prepared from replies to a

STATE.	Name of railway.	Length of track (miles).	AVERAGE SPEED OF CARS IN MILES PER HOUR.		Frequency of passenger cars on main lines.	Estimated average distance traveled by each passenger, in miles.	Estimated average fare per mile (cents).
			Entire trip.	Outside of town limits.			
1 New York	Schenectady Railway Company	36.12	15 to 16	20	1 hour		
2 Pennsylvania	Lehigh Traction Company	20.09	12		30 minutes		
3	Wilkesbarre and Hazelton Railroad Company	28.00	30		1 hour		2.25
4 Ohio	Youngstown-Sharon Railway and Light Company	42.25	16 to 20	20 to 25	30 minutes and 1 hour.		0.8-1.04
5	Stark Electric Railroad Company	26.97	23		1 hour		
6	Western Ohio Railway Company	77.97	20		1 hour		
7	Cincinnati, Dayton and Toledo Traction Company	78.35			30 minutes		
8	Columbus, Buckeye Lake and Newark Traction Company	43.50			1 hour	16	1.4
9	Eastern Ohio Traction Company	90.00	20		1 hour	10	2
10	Dayton and Xenia Transit Company	50.12	16		45 minutes		1.33
11 Michigan	Detroit, Ypsilanti, Ann Arbor and Jackson Railway	91.42	20		30 minutes and 1 hour.	13	1.125
12	Detroit, Monroe and Toledo Railway Company (Toledo and Monroe).	29.92	21		1 hour		
13 Indiana	Indianapolis, Columbus and Southern Railroad Company (Indianapolis, Greenwood and Franklin).	19.00	18	22	1 hour	11	1.4
14	Richmond Street and Interurban Railway Company	30.50	18 to 24		1 hour		1.5
15	Indianapolis and Eastern Railway Company	18.04	20		1 hour		
16 Illinois	Peoria and Pekin Terminal Railway Company	8.68	15		20 to 30 minutes	5	
17	Chicago and Joliet Electric Railway Company	62.89	20		30 minutes and 1 hour.		1.5
18 Iowa	Waterloo and Cedar Falls Rapid Transit Company	40.00	12 to 20		1 hour		

¹ Included in preceding.² Summer resort increases travel 50 per cent during the season.

interurban railways.

special schedule of inquiries.]

ESTIMATED PROPORTION OF PASSENGERS WHO ARE CARRIED—			Percentage of total steam and electric traffic carried by electric lines.	Effect on local business of steam railways.	Proportion of earnings from freight, mail, and express to total revenue, approximate (percentage).	Character of freight and express carried.	Remarks regarding freight and express.	
Wholly within towns (percentage).	Between towns (percentage).	Between town and country (percentage).						
75	25	(1)	96.....	Decreased 80 per cent; fares unchanged.	4.5	Groceries and provisions, small farm products, dry goods.	Will handle greater part of high-class goods ultimately.	1
Few.	Nearly all.	Few.	99.....	Practically all taken away; trains taken off.	1	Packages	Mining region.....	2
	97.5	2.5	80 to 90.....	Reduced greatly; trains taken off.				3
10	75	15		Round-trip fares reduced		Just beginning	Is creating much new business; expects much express.	4
	Nearly all.		75 to 90.....	Local business reduced, but long-distance travel created.		Undeveloped		5
0.5	94.5	5	Much greater part	Reduced slightly		Fruits, produce, groceries. Mostly merchandise in packages.	98 per cent is between towns. Express handled by separate company; heavy freight not sought.	6
30	65	5		Little effect.				7
	28.5	15	90.....	Much reduced	6	Express		8
			95.....	No direct competition	25	General	Handles cars from steam roads	9
						Groceries, beer, fruits, merchandise.		10
15	75	10	65.....	Little reduction	9	Farm produce, groceries, dry goods, light merchandise.		11
					8			12
3	77	20	98.....	Reduced		Milk; beginning only		13
40	40	20	Practically all.....					14
5	90	5	80.....	Steam fares reduced one-half.			Handled by steam locomotives.	15
20	70	10	60.....	Affected smaller stations only.		Produce, groceries, milk, beer.		16
30	60	10	95.....	No effect	25	General; rapidly growing.	Interchange with steam roads; uses steam in part.	17

The electric interurban railways possess, in contrast with steam railroads, several peculiar characteristics which directly affect their methods of operation, and these in turn determine the amount and character of their traffic.

Small units and frequent service.—The greatest difference between the electric and the steam railway lies in the fact that the former operates cars each of which has its own motors, supplied with energy from a single distant source, while the cars of the latter are moved by a separate locomotive which generates its own power. The economy of large scale power production is secured by the electric railway through the construction of a central station. It is, therefore, practically as cheap to run electric cars separately as to run them in trains. On the other hand, the cost of operating a steam railway is greatly reduced by increasing the size of engines and the length of trains. Steam operation, therefore, tends to infrequent service, while electric operation lends itself to frequent service.

The preceding tabular presentation of replies shows that in the Middle West, where the interurban railways usually connect rather small and quite widely separated towns with one another or with larger cities, the passenger cars run, as a rule, once each hour, though sometimes more frequently. The steam trains which actually stop at these minor towns number ordinarily not more than four or five each way per day. The very smallest country villages on the steam roads often have still less frequent train service. Where, as in the more densely populated parts of Massachusetts, the urban communities connected by electric lines are larger and nearer together, the frequency of the electric service is often much greater than that in the Middle West, and such frequency of service means great convenience and saving of time to patrons.

Frequency of stops.—The fact that single units of comparatively light weight are operated upon electric railways permits stops to be made much more quickly than with heavy steam trains, and likewise permits a much more rapid acceleration after the start. Acceleration is also favored by the nature of electric power and motors. It is, therefore, possible for interurban cars to make comparatively frequent stops while maintaining a high average speed. This fact also tends greatly to increase patronage.

Cost of operation and fares lower than for steam railways.—For reasons which need not be taken up here electric traction is cheaper for short distances and light traffic than steam traction. Interurban electric railways have, therefore, found it possible to charge fares materially below those of the steam railways, and as a result have not merely taken away traffic from the latter, but have developed traffic which otherwise would not have existed at all. The relation between low fares and low operating expenses is reciprocal. Low operating costs make low fares possible, and on the other hand

the reduction of charges stimulates traffic and thereby reduces operating costs and still more fixed charges per passenger.

The replies of interurban railways above presented indicate, in some cases by rather rough estimates, the average rate of fare per mile on typical interurban lines. Most of these lines approximate the steam railways closely in the quality and speed of their local service. The fare is usually from 1½ to 2 cents per mile, 1½ cents representing a rough average. Frequently some reduction is made for return trips. In most sections of the country the local fares of steam railways for one-way tickets are about 3 cents per mile. On many electric railways, which connect closely neighboring cities and towns and which have dense traffic, the charges per mile are materially less than those above indicated. This is true, for instance, in Massachusetts.

A prominent steam railway company, operating in several states, submitted to the Bureau of the Census a detailed list of all towns connected both by its lines and by electric railways, with the respective rates of fare in each case. The fares of the steam road for one-way tickets were from one and one-half to five times as much as those of the parallel electric roads. Broadly speaking, the steam railway fares averaged about double those of the electric lines.

The following is a specific comparison of some of the rates of fare on steam and fast electric railways in Ohio:

Comparative fares of steam and electric railways in Ohio.

JOURNEY.	DISTANCE (MILES).		FARE, ONE-WAY.		FARE, ROUND TRIP.	
	Steam.	Elec- tric.	Steam.	Elec- tric.	Steam.	Elec- tric.
Cleveland to Ravenna.....	57	45	\$1.15	\$0.70	\$2.07	\$1.10
Cleveland to Akron.....	38	36	1.00	.60	1.80	1.00
Canton to Akron.....	23	21	.70	.35	.83	.65
Massillon to Uhrichsville....	35	37	1.05	.55	1.89	1.00
Cleveland to Creston.....	49	49	1.50	.85	2.70	1.45
Columbus to Newark.....	33	37	1.00	.60	1.80	1.00
Newcastle, Pa., to Youngs- town, Ohio.....	21	18	.65	.30	1.17	.60

Operation in the streets of towns and cities.—By running upon the public streets when they enter a city or town, and by making frequent stops within municipal limits, electric railways become usually much more accessible to passengers than steam railroads, which, as a rule, have only a single station in a town, and that, perhaps, at some distance from its business center. The electric railway is also able to create in addition to its interurban traffic a considerable amount of new traffic within the limits of towns. On the other hand the electric car suffers a considerable disadvantage in the eyes of through passengers, because of the necessity of reducing its speed while passing through municipalities. This matter is less serious in the small towns, but in the larger cities the speed of cars is so much reduced, and the distances to be covered at a slow pace are so great, that the duration of the journey of many inter-

urban passengers is materially augmented. Ultimately many interurban railways will probably secure entrance into cities on private rights of way, or on elevated or underground tracks, but the heavy expense involved will delay the adoption of this policy.

Other advantages of electric lines for interurban service.—Other peculiarities of interurban railway service, although they are of less importance, may be mentioned. One of these is the fact that the electric car can surmount grades and pass curves more readily than a steam train. This enables electric railways often to take shorter routes than the steam roads, and sometimes to reach villages or rich rural sections not considered accessible by the steam railways. Again electric railways, being capable of earning a profit from purely local business, are often built to connect towns directly, where it was formerly possible to travel from one to the other only by a roundabout journey and a change of cars. The freedom from smoke is a material advantage of electric over steam railways. This advantage is particularly appreciated in the summer, when it permits the electric lines to operate open or semiconvertible cars, giving the patrons the pleasure of a fast open-air ride.

Nature and social advantages of passenger traffic.—The importance of the advantages possessed by electric railways for local traffic is sufficiently shown by the extent of their business and by the financial results, which have already been discussed. The interurban railways have greatly increased the aggregate amount of travel in those sections where they exist, the number of passengers carried by the electric lines being usually materially greater than the number formerly carried between the same points by the steam railways. Several of the replies received by the Bureau of the Census from interurban railway companies emphasize this point. The president of the Detroit, Ypsilanti, Ann Arbor and Jackson Railway Company said: "The increased travel is new business developed by the electric road from the population that very seldom travel by steam." The representatives of an important company in Ohio said they were informed that, before the electric railway was built between two particular cities of medium size, the steam railroad did a business between them of about \$2,000 per month. The electric railway now does three times that amount of business with a very much lower rate of fare, while the steam railroad seems to be handling about the same volume of business as before. Several of the officers of steam railways who reported to the Bureau of the Census regarding electric competition also dwelt upon the large new traffic created by the electric lines. (See page 117.)

A part of this new passenger traffic represents the patronage of farmers and their families. To the agricultural population as such the steam railways offer no special conveniences. The farmer must go to town to

take the train. If he lives on an electric railway, the car may stop at his very door. As appears from the tabulation on page 109, most of the interurban companies which reported on rural patronage estimated that from 5 to 20 per cent of their traffic was from the rural population. That the proportion is not larger is due chiefly to the fact that farm dwellings are so widely scattered. A system of interurban railways connecting all the towns and villages in a given section would be conveniently accessible to only a fraction of the agricultural community.

The importance of the service of the electric railway to such of the rural population as come within its reach can scarcely be overestimated. The farmer and the members of his family can go to the neighboring village at the time most convenient to them, and far more quickly, cheaply, and comfortably than by team. In many cases they even become accustomed to make frequent trips to larger cities at a greater distance. The contact with town and city life which is thus made possible contributes greatly to the breadth of view, culture, and happiness of the farm family. The accessibility to markets and shops improves the table and dress and increases the comforts of the home. The social life, the amusements, and the varied interests of the town are made accessible to the country dweller as never before. The children are enabled readily to avail themselves of the superior school facilities of the town. In fact, the electric railway has doubtless contributed materially toward the advancement of the modern movement for the consolidation of rural schools.

Even more important has been the new traffic created by the trolley railway from among the inhabitants of small and medium-sized towns. The greater part of the traffic of most interurban railways either moves between such towns or between them and larger cities. The increased accessibility of the cities to village dwellers is one of the most important services of interurban railways. Many of the interurban lines of the miscellaneous group connect smaller towns only, but it has been found by experience that those lines which reach large cities are the most profitable. In such cities the shopper finds greater variety and often lower prices than at his home town. There the pleasure seeker finds opportunities for enjoyment vastly superior to those in the small towns. Some interurban electric railways have adopted the practice of running special theater cars.

The convenience of the electric service has greatly increased the amount of travel for purposes purely of pleasure and of social intercourse. From the social standpoint it is probably safe to say that these railways have proved a greater benefit to the women of the communities they serve than to the men. The trolley railway widens the circle of acquaintanceship. Not infrequently special cars are chartered by parties for picnics or for some other social object. Interurban

railways likewise offer facilities for travel, both from the small towns and from the large cities, to outing places and other pleasure resorts, such resorts being maintained in a number of instances at the expense of the interurban companies themselves.

The influence of electric railways in fostering suburban life has already been pointed out in another connection. (See page 28.) It is worthy of note here that some of the longer interurban railways are seeking to develop a form of long-distance suburban traffic—that is, the traffic of persons who go every day to their business in the city and live in the small town. One method adopted to further this object is that of the operation of “limited” cars on a fast schedule on several railways. Thus there is a “limited” service between Cleveland and Painesville, which permits business men to live in the smaller town and yet to reach their offices in the city, 25 miles away, within an hour. Three “limited” cars are also run each way daily between Toledo and Cleveland.

Nature of freight and express traffic.—The method of conducting freight and express business on interurban railways is discussed in Part II, Chapter IV. The nature of this traffic varies considerably on different railways, as may be seen from the statements, tabulated on page 109, regarding the leading articles carried by several important lines. Generally speaking the traffic consists of light weight commodities.

The significance of the electric railway as a factor in the transportation of commodities lies chiefly in two directions. In the first place it carries considerable quantities of goods between town and country. This transportation business it has largely created, for it either carries goods which were not carried at all before, or else it carries goods previously transported by wagon rather than by steam railway. The farmers who live within a reasonable distance of the electric line can send their milk, butter, provisions, vegetables, and fruits to market far more promptly and easily than before. In this way the nature of farm industry has been materially affected in some communities where the freight business of the electric railways has been highly developed. Moreover, the farmer can get groceries, meats, dry goods, and other light articles from the town much more easily than before the advent of the railway. In the second place, the electric railway furnishes much more frequent and prompt service between small towns, and between these towns and large cities, than is furnished by the steam railways. This is the case not only as compared with the light freight traffic on steam lines but even as compared with their express traffic.

People living in the small towns served by electric railways can now obtain packages of merchandise from the cities more cheaply and promptly than ever before. Local merchants are already making extensive use of

the interurban lines to obtain smaller consignments of merchandise.

The electric railways have in most instances not yet attempted to carry heavy freight. They usually do no carload business and have no arrangements for exchanging freight with the steam railways. It has been held by the New York courts that a steam railway, as a common carrier, is bound to exchange freight with electric lines and to furnish the same facilities for doing so that it furnishes to steam railways. Many representatives of the interurban roads express the opinion that the business of handling express and light freight may be greatly developed, but that there is little to be gained by entering the field of general freight traffic. The cases where electric lines have undertaken a general freight business are usually explained by exceptional local conditions.

Influence of interurban railways on local retail business.—At this point the question arises as to the economic effect of electric interurban railways upon the business of small towns. The class most likely to be affected in its economic interests is that of the local merchants. It scarcely seems probable that the location of manufacturing industries can be materially affected by interurban railways. These railways doubtless tend in some measure to increase local population in cases where the town is near enough to a great city, or to a small industrial center undesirable for residence purposes, to draw as residents people who are engaged in business elsewhere. For example, part of the recent increase in population in Elyria, Ohio, consists of those employed in the new steel and other industries at Lorain, a few miles distant. The small town may also draw some permanent residents from the agricultural sections, who, because of the improved methods of transportation, can reach their farms easily. Increased population, of course, benefits retail trade and local economic interests generally. On the other hand, the railway may tend to take away some of the former patronage of retail merchants, not merely because of the convenience with which customers can go to the larger cities to buy goods, but also because of the convenience with which goods ordered by mail can be delivered. The competition is likely to be felt most keenly by merchants who handle the most valuable and least perishable classes of commodities. But even if there were a net economic injury to the local merchants, the economic advantage to the buyers of goods would probably more than offset the injury, and, from the broad social standpoint, may properly be considered as more important.

In order to ascertain the opinions of merchants themselves regarding the effects of electric railways, the Bureau of the Census addressed schedules of inquiry to prominent dealers in numerous towns that are connected with larger cities by fast and efficient interurban roads.

INTERURBAN RAILWAYS—ECONOMIC, FINANCIAL, AND SOCIAL FEATURES. 113

These schedules were sent chiefly to dealers in dry goods, clothing, and general merchandise. A considerable number of replies were secured, mostly from towns of between 3,000 and 20,000 inhabitants. The gist of these replies is presented in the statement below, which distinguishes the towns of less than 5,000 inhabitants from those of larger size. Four of the most important questions contained in the schedule were as follows:

Have you observed any decline in your trade because people of the town take advantage of the electric railway to go to the larger city to buy goods?

Have you observed an increased patronage from farmers and their families as a result of the development of the electric railway?

What is the general feeling among merchants and business men in your town as to the advantage or disadvantage to them from the construction of interurban electric railways?

Has the interurban railway facilitated your business in any other way, as by enabling you to get goods from the city more promptly, to go to the city to make wholesale purchases, or otherwise?

The answers to these questions are presented in the last four columns of the statement, the last column containing in addition certain other general remarks of a pertinent character which accompanied the answers.

STREET AND ELECTRIC RAILWAYS.

Effect of electric interurban railways

[Replies of local merchants to a

A.—TOWNS OF LESS

Number.	LARGE CITIES WITH WHICH CONNECTED.	Name of town reporting.	Popula- tion.	Approx- imate dis- tance from city (miles).	Merchants' class of busi- ness.
1	Philadelphia and Allentown, Pa.	Quakertown, Pa.	3,014	40-15	General merchandise
2	Erie, Pa.	Cambridge Springs, Pa.	1,495	25	General merchandise
3	Cleveland, Ohio	Chagrin Falls, Ohio.	1,586	20	Dry goods
4	Cleveland, Ohio	Oberlin, Ohio	4,082	30	Clothing
5	Cleveland and Akron, Ohio	Kent, Ohio	4,541	30-10	General merchandise
6	Cleveland and Akron, Ohio	Ravenna, Ohio	4,005	35-15	Dry goods
7	Toledo, Ohio	Perrysburg, Ohio	1,766	10	Dry goods and clothing
8	Toledo, Ohio	Perrysburg, Ohio	1,766	10	Groceries and provisions
9	Dayton, Ohio	Franklin, Ohio	2,724	15	General merchandise
10	Dayton, Ohio	Miamisburg, Ohio	3,941	15	Dry goods
11	Cincinnati, Ohio	Harrison, Ohio	1,760	20	General merchandise
12	Youngstown, Ohio, and Newcastle, Pa.	Hubbard, Ohio	1,230	8-15	General merchandise
13	Detroit, Mich.	Marine City, Mich.	8,829	40	Dry goods and carpets
14	Los Angeles, Cal.	Santa Monica, Cal.	3,037	15	Dry goods
15	Indianapolis, Ind.	Greenfield, Ind.	4,489	20	General merchandise

B.—TOWNS OF MORE

16	Albany and Troy, N. Y.	Glens Falls, N. Y.	12,613	45-40	Dry goods
17	Albany and Troy, N. Y.	Cohoes, N. Y.	23,910	10-5	Dry goods
18	Cleveland, Ohio	Elyria, Ohio	8,791	25	Dry goods
19	Cleveland, Akron, and Canton, Ohio	Massillon, Ohio	11,944	50-20-10	Dry goods
20	Toledo, Ohio	Bowling Green, Ohio	5,067	25	Dry goods and clothing
21	Toledo, Ohio	Adrian, Mich.	9,654	30	Dry goods
22	Dayton, Ohio	Xenia, Ohio	8,696	15	General merchandise
23	Dayton, Ohio	Greenville, Ohio	5,501	35	General merchandise
24	Dayton, Ohio	Troy, Ohio	5,881	20	Dry goods
25	Youngstown, Ohio	Warren, Ohio	8,529	15	Dry goods
26	Detroit, Mich.	Jackson, Mich.	25,180	70	Dry goods
27	Detroit, Mich.	Flint, Mich.	13,103	60	General merchandise
28	Detroit, Mich.	Mt. Clemens, Mich.	6,576	20	Dry goods
29	Detroit, Mich.	Ypsilanti, Mich.	7,378	35	Dry goods
30	Grand Rapids, Mich.	Holland, Mich.	7,790	25	Furniture
31	St. Louis, Mo.	Bellefonte, Ill.	17,484	15	Dry goods
32	St. Louis, Mo.	East St. Louis, Ill.	29,655	55	Dry goods
33	Fort Wayne, Ind.	Peru, Ind.	8,463	55	General merchandise
34	Chicago, Ill.	Evanston, Ill.	19,259	15	General merchandise
35	Chicago, Ill.	Joliet, Ill.	29,353	35	Dry goods

INTERURBAN RAILWAYS—ECONOMIC, FINANCIAL, AND SOCIAL FEATURES. 115

upon retail business in small towns.

special schedule of inquiries.]

THAN 5,000 POPULATION.

Effect of railways on sales to people in town.	Effect on sales to farmers and people from smaller villages.	General opinion of merchants as to effect of railways.	Remarks.	Number.
Decrease	Some increase	Harmful	Trade about 6 per cent less in 1903 than in 1902.	1
No effect	Increase, especially in bad weather.	No harm	Smallest towns suffer	2
Many go to city	No effect	No reply	"Bleeding us and feeding cities"	3
No effect	Increase	Merchants about evenly divided.	Sales increased about 40 per cent since 1896.	4
Our trade increased	Increase in rainy weather.	Majority think beneficial	Can get goods more promptly	5
No injury	Increase	Beneficial	Increased facilities for going to market and transporting merchandise.	6
No injury	Little effect	Beneficial	Convenience in getting goods at short notice.	7
No injury	No effect	Beneficial	"Big city will swallow."	8
Decrease	No effect	No reply	If 20 miles away from city would be all right.	9
Checks increase	Decrease	Harmful	Better class of trade goes exclusively to large town.	10
Decrease	No effect	Harmful	Increase of population using interurban cars to go to work.	11
No injury	Increase	Beneficial	Increase of trade about 18 per cent in four years.	12
No injury	Increase	All think beneficial	Sales rapidly increasing; country prospering; aid in getting of goods.	13
Takes away certain classes of trade.	No effect	Great benefit	Easier to get goods; carry less stock.	14
Decline in clothing	Increase	Very beneficial.		15

THAN 5,000 POPULATION.

Increase	Decided increase	Great advantage	Sales have increased over 50 per cent in five years.	16
No decrease	No effect	Somewhat injurious.		17
No decrease	Increase	Indifferent		18
No decrease	Increase, especially in bad weather.	Beneficial	Social benefits generally	19
No decrease	Increase	Formerly opposed, now favor		20
Little decrease	No reply	No reply	Town of this size can hold its own	21
Marked decrease	Decreased; take cars to Dayton.	No reply	Cash stores suffer most	22
No decrease	Increase	Beneficial	Our own town is county seat; will draw business.	23
Little change	Increase	No fear		24
No decrease	None	No reply		25
No decrease	Increase	Beneficial	Small towns also benefit.	26
No decrease	Increase	Beneficial		27
Decrease	None	Disadvantage	Concentrates business in cities	28
Checks increase	None	Great detriment.	Concentrates business in cities	29
Some decrease	None	Varying		30
No decrease	Increase	Beneficial	This is a growing town.	31
Decrease	Increase	No reply	Reduced fare to city injurious	32
No decrease	Marked increase	Very beneficial.		33
Decrease	No farm trade.	Injurious.		34
Decrease	Increase	Beneficial	Sales increased 15 per cent since road was completed.	35

A marked diversity of opinion appears among these replies. Doubtless the differences are partly due to the "personal equation," but in part they must represent differences in actual conditions. Whether the effect of the opening of an electric railway between a town and a large city will be beneficial or injurious to the town merchants depends upon the size of the town, upon its distance from the city, upon the comparative excellence of the shops, upon the character of the rural population surrounding the town and the extent to which that population is served by the railway, and upon other similar causes.

Of the merchants in towns of less than 5,000 inhabitants, 5 express in one form or another the opinion that the interurban railway has been detrimental to their interests, 8 hold that they have been benefited, 2 are indefinite, and 2 do not reply. In most cases the persons who reply think that the general opinion of merchants agrees with their own.

Five merchants in the 20 towns of more than 5,000 inhabitants declare that they have suffered injury from the electric railway. One of these towns, Evanston, however, is essentially a suburb. The merchants of Ypsilanti and Mt. Clemens are particularly emphatic. These towns lie 20 miles or more from Detroit, but they have highly efficient electric service. They are in a rich agricultural region, and one might expect some increase in trade from farmers who patronize the electric railway, but such increase is denied in these reports.

A majority of the merchants of this group, however, assert that the local retailers have derived a benefit. Several of the replies, however, come from towns of considerable size, situated at some distance from any large city. The new railways naturally bring trade to such towns from the smaller villages. Several of the dealers of this group, especially in the larger and more distant towns, emphasize that point strongly. Numerous dealers in towns of less than 5,000 inhabitants, as well as in the larger towns, report an increase in their country trade as the effect of the trolley lines, three referring particularly to the advantage in this respect during inclement weather. Several merchants also speak of the advantage which the railway has conferred in enabling them conveniently to go to the city to make wholesale purchases, and also in enabling them, through the express and freight service, to get goods delivered more promptly, thus avoiding the necessity of keeping large stocks or of disappointing customers.

Some of the replies from merchants are very suggestive. One from Massillon, Ohio, says:

Complaints are occasionally heard from merchants and dealers in small places and country towns that the interurban lines would carry their trade to the larger places, but I think in most cases they have been more than compensated by the extra number of people coming in and going out all the time and, as a rule, are very well satisfied after the lines are established. The old idea of carrying off trade and scaring the horses is dying out, and we predict that

before long the electric lines will be carrying the bulk of the farmers' produce to market.

The following is from a large concern in Jackson, Michigan.

We anticipate that trading centers, both large and small, will be considerably benefited by the extension of electric car service. If we lose by customers going to the larger city in some instances, we gain by an increased number coming from smaller places to us, and smaller towns will benefit by the ease with which farmers can get to them.

In opposition to the opinions of these two merchants as to the benefit derived from the electric railway by the smallest towns should be noted two or three replies from towns which have experienced a benefit, in which the opinion is expressed that retail trade in smaller towns has suffered. Had more numerous replies been secured from towns of less than 2,000 inhabitants, it is possible that the proportion of unfavorable opinions would have been larger.

There can be little doubt that more people than formerly go from the small towns reached by electric railways to the cities to buy certain classes of goods. In some, and possibly a majority of instances, this loss to the local merchant is more than offset by the increased population of the town and by the increased patronage from the farming classes. That the merchants in the large cities served by interurban railways have profited to some extent is beyond question. The Bureau of the Census, in fact, received replies to its schedule of inquiries from a number of merchants in such towns as Akron, Dayton, and Syracuse, which asserted that trade had been materially increased by the interurban lines. The electric railway not merely creates new passenger traffic but it creates at the same time a new demand for goods and augments the total retail trade of the sections served.

IV.

INFLUENCE OF INTERURBAN ELECTRIC RAILWAYS ON STEAM RAILWAYS.

The frequent service, convenient stops, and low fares of interurban electric railways have, in many instances, seriously affected the local traffic of steam railways connecting the same towns, this being specifically asserted in many of the replies from interurban railways presented on page 109.

It is probable that the increase in the average length of journeys on steam railways, as revealed by the official statistics, is in part attributable to the relative decline of local traffic through electric competition. During the five or six years prior to 1897 the average length of passenger rides on the steam railways had not increased by more than 5 per cent. On the other hand, the average ride increased from 25.04 miles in 1897 to 30.3 miles in 1902, or 21 per cent.¹

¹Statistics of the Railways of the United States, 1902, page 64.

There is considerable difference of opinion as to whether, in general, electric railway competition up to the present time has been injurious to the interests of the steam railways. In order to ascertain the views of railroad officials themselves on this subject, inquiries were addressed to the traffic officers of the leading railroads in the Northern and Eastern states. Replies were received from 14 of these companies, namely: The Baltimore and Ohio; Boston and Albany; Boston and Maine; Chicago, Cincinnati, and Louisville; Erie; Flint and Pere Marquette; Lake Erie and Western; Lake Shore and Michigan Southern; Lehigh Valley; New York, Chicago and St. Louis; New York, New Haven and Hartford; Pennsylvania; Toledo, St. Louis and Western; and the Wabash. The substance of these replies is presented in the tabular statement below.

Replies of steam railroads regarding the effect of electric railway competition.

Number.	EFFECT OF ELECTRIC LINES IN DECREASING TRAFFIC BETWEEN COMPETING POINTS.	Effect on long-distance traffic.	EFFECT ON PRACTICE OF STEAM LINES.		Ultimate and general effect on steam lines.
			Fares.	Number of trains.	
1	For distances of 15 miles or less; proportion lost varies.	Inappreciable	Reduced on one branch.	Increased by 11.....	Do not anticipate greater competition; can not tell.
2	90 per cent.....	No reply.....	Reduced in a few cases.	None	Will become more serious competitors in long-distance travel.
3	Considerable	No reply.....	None	Trains and stops reduced; better service for longer rides.	No reply.
4	10 miles or less, decrease 90 per cent; 10 to 50 miles, 50 to 75 per cent.	None	None	Decreased to minimum.	Will cut into business up to 50 miles.
5	Decreased for distances to 25 miles.	None	No reply.....	No reply.....	Steam lines can not overcome loss of business by lowering fares.
6	Material.....	No reply.....	No reply.....	No reply.....	No reply.
7	Enormous.....	No reply.....	No reply.....	No reply.....	No reply.
8	Some.....	Cross lines serve as feeders.	None	None	Beneficial; creating long-distance travel.
9	75 per cent.....	None	Reduced slightly.....	None	No immediate change anticipated.
10	Practically all business done by electric line. ¹	No reply.....	None	None	Serious where lines are parallel, at least on local business.
11	About 25 per cent	Will finally increase it	Reduced	None	Beneficial; increasing long-distance travel.
12	25 to 75 per cent	None	None	None	Will take away more business by extension.
13	Increase checked	Increased at one or two points.	Reduced	None	Not serious; probably creates freight business to suburbs.
14	25 to 75 per cent	None	None	None	New lines will cut further into local traffic.

¹ Electric railway built before steam road.

Of the 14 replies in the table, one states that increase in local steam railway traffic between points served by the electric railways has been checked, while all the rest say that local traffic has been reduced, in most cases very sharply. The distance within which electric competition is at present effective naturally varies with the efficiency of the electric service.

Statistics showing the effect of interurban competition have been published in various railroad and other periodicals. Thus, one journal states that on the Lake Shore and Michigan Southern Railroad the number of local passengers carried between Cleveland and Oberlin and intermediate points fell from 203,014 in 1895 to 91,761 in 1902, and the number carried between Cleveland and Painesville fell from 199,292 to 28,708. On the New York, Chicago and St. Louis Railroad the passengers between Cleveland and Lorain fell from 42,526 in 1895 to 9,795 in 1902.¹

Some of the representatives of interurban railways

¹ Railroad Gazette, January 22, 1904.

the names of the individual companies being omitted. The first 7 companies in the table are situated, in whole or in part, in the seaboard states, while the last 7 are situated in the North Central states. The most important questions in the schedule were as follows, the questions corresponding in order to the columns in the statement:

To what extent, if at all, has the local passenger traffic of your company been reduced by the competition of these lines?

To what extent, if at all, has long-distance traffic on your railroad been created by the conveniences offered by electric railways for reaching the steam road?

Has your company, as the result of electric railway competition, (a) Reduced fares? (b) Increased or decreased the number of trains? (c) Otherwise changed or improved its local service?

Do you anticipate such further extension or improvement of interurban lines as to render them more serious competitors for either local or long-distance passenger traffic?

assert that whatever loss the steam railways suffer in local traffic is offset by the gain in long-distance traffic induced by the electric lines. The fact is pointed out that much of the passenger traffic on the electric railways is new traffic. It is suggested that the habit of traveling is being developed among people who formerly seldom traveled at all, and that this fact, combined with the fact that steam railways have been made more accessible through connection with electric lines, leads to the conclusion that steam railway systems will ultimately be benefited, if they are not already deriving benefit. An official of a prominent eastern steam road recently asserted that the electric roads take away about 65 per cent of the local business, but in a year or two new through business, more profitable than that lost, comes to the steam railway through the aid of its competitor. Three of the officials of steam railways, replying to questions of the Bureau of the Census, take somewhat the same position. One says, "I myself do not view competition as being detrimental to the interests

of this company. Am of the opinion that interurban lines, as a whole, will finally work out to the good of the public and induce long-distance travel by people who have heretofore been indifferent to things that were not purely local." This official, however, does not claim that the benefit mentioned has been as yet definitely experienced.

A majority of the replies from officers of the steam lines, however, deny that there has been an increase in long-distance travel as a result of the electric railways, and several assert that they expect still more serious injury in the future from the increase in the number and length of electric lines and the improvement of their facilities. The consensus of opinion seems to be distinctly hostile to the electric railways. Doubtless the time has been too short to enable steam railway officials to reach final conclusions on this subject, and it is perhaps natural that they should at first be more suspicious and hostile than the ultimate effects of electric competition would justify.

The policy of steam railways with regard to meeting electric competition varies greatly and is much affected by the local conditions. Five of the 14 replies above tabulated state that local fares have been reduced, at least in some cases, but 6 assert definitely that this has not been done. Another company says that because of the other advantages possessed by electric railways the loss of business can not be overcome by lowering the fares on the steam railways. This appears to be the general view of steam railway men.¹ Two of the companies report that they have been forced to reduce the number of local trains on account of inability to compete with electric lines. One company, on the other hand, apparently as a competitive measure, has increased to some extent its local train service.

As an illustration of a policy which is probably pursued by a considerable number of companies, the following more extended quotation from the reply of a prominent traffic official may be given:

It has been the policy of this company not to meet trolley competition by a reduction in rates, for the reason that this action on one division of our system would create jealousy on the part of people living in other suburban territory, and is likely to result in similar reductions on all branches in suburban districts.

Our experience has taught us that the electric railway, in being able to take the passenger from his house direct to his office at a nominal rate, eventually gets enough of the steam line's traffic to eat up all its profit and it can not be covered by any reduction in rates. We have therefore followed the method employed by [certain other lines], viz, to take off stops at near-by points most affected by trolley competition, thus giving patrons at stations farther away from the terminal quicker and better service, and wait for the overflow travel served by the trolley lines in the outlying districts, which seeks the railroads in bad weather and eventually increases to some extent its aggregate of business.

The open trolley cars in warm weather are particularly attractive to the suburbanite, as is shown by a comparison of the earnings of our * * * branch during the month of August as compared

with November, aggregating about \$5,590 in the former and \$11,700 in the latter.

The suggestion in this letter that the reduction of certain kinds of suburban service on the steam railways permits improvements in other parts of the service, is one which has been brought out at various times by other representatives of the steam railways. Some few have gone so far as to hold that the benefit resulting from the reduction of the local service was greater than the injury suffered. A writer in a prominent railway journal has even claimed that suburban service is usually unprofitable to the steam railways and that it interferes very seriously with their through traffic.² Evidently what would hold true of some railways would not hold true of others. Some companies have derived a large part of their revenue from local passenger traffic, and have built branches primarily to accommodate such traffic. It is probably a fair conclusion from experience that a main line may gain traffic by being paralleled by an electric railway, but that a branch line is almost sure to lose.

Two or three of the important steam railways which have been most affected by electric competition have sought to meet it by themselves introducing electric service between certain points. As far back as 1895, the New York, New Haven and Hartford Railroad Company equipped its Nantasket Beach system with electricity, and later three other branch lines were so equipped. The most important of these branches is that between Providence and Fall River. The fare between these points was reduced from 50 to 20 cents, and the frequency of service greatly increased. More recently, the Boston and Maine Railroad has built an electric line for heavy service between Concord and Manchester, N. H., and it also controls an electric system in Maine. The Pennsylvania Company has an electric system along the seashore in southern New Jersey. The Long Island Railroad has a stretch of track along the seashore which it has equipped with overhead trolley wires. Local electric cars and steam trains covering longer journeys operate over the same track. Such a combination has at the present stage of development many advantages, but the conditions of traffic are not always adapted to it.

In several instances electric traction has been applied to entire railways which were formerly operated by steam, or has been combined with steam traction on new lines. In most such cases, freight traffic is hauled by steam locomotives. Among railways of this type are the Cincinnati, Georgetown and Portsmouth, the new line between Bellaire and Zanesville, Ohio, the Peoria and Pekin Terminal Railway, and the Waterloo and Cedar Falls Railway (Iowa).

In two or three instances, steam railways have permitted separate companies to equip a part of their tracks

¹ See, e. g., editorial in Railroad Gazette, January 22, 1904.

² Quoted in Street Railway Journal, August 23, 1902; compare Railroad Gazette, January 22, 1904.

with electricity for the handling of local traffic. Such an arrangement exists on the line of the Northern Pacific Railway between Everett and Snohomish, Washington.

It is very probable that steam railways will, to an increasing extent, equip existing tracks with electricity for the hauling of a part or all of their traffic, or will build new electric lines at least for suburban passenger service. While the main purpose of the New York Central and Pennsylvania railways in introducing electric traction at their New York termini is to promote safety in the tunnels, they will gain also in the greater attractiveness, frequency, and cheapness of the suburban service which they furnish. In the case of the New York Central, at least, suburban trains will be operated to their destination by electricity. Two serious difficulties are, however, encountered by steam railways in attempting to use electricity for suburban trains. In the first place, it is hard to carry the electric current through the complicated switch tracks in the terminal yards. In the second place, if trains are run often enough to compete with those of the purely electric railways, they are likely to interfere with through passenger and freight trains. Indeed, the suburban service of a large city, whether conducted by steam or electricity, can be made thoroughly satisfactory only where it uses its own tracks, completely separated from the tracks devoted to through traffic.

This last consideration also bears on the question of the general future development of electric railways. It is not likely that interurban electric lines of the present type, even though they may be extended into long systems, can handle satisfactorily and on a large scale both local and through passenger and freight business. Even if single tracks be replaced by double tracks there is apt to be great interference between these different classes of traffic as soon as the aggregate

business becomes heavy. The advantage of the local service of the interurban lines consists in its frequency and its numerous stops. Local cars are very likely, therefore, to get in the way of fast through trains; while on the other hand the slower through freight trains will tend to impede the local passenger cars. It has been suggested that freight trains might be broken up into separate units. This would largely do away with the necessity of switching, which is one of the chief causes of the delay in handling steam railway freight, and would thus increase the speed of through freight service. But to do this would so greatly multiply the number of moving units on lines with an extensive business that a single track could not possibly accommodate all the traffic in one direction.

These same considerations also cast doubt upon the possibility of so revolutionizing the working of the more important of the present steam railways, by the partial or complete introduction of electric power, as to enable them to perform both their present functions and the added functions of the interurban lines. Wherever traffic is very dense two distinct railway systems seem desirable—one for local traffic, both passenger and freight, and the other for through traffic. Both of these systems may ultimately be operated by electricity. Both kinds of railways in a given section may finally fall under the same ownership. Cooperation between them would afford many conveniences and economies. But the public will gain if these two conflicting kinds of traffic are handled on separate tracks. Where, however, the aggregate traffic is comparatively light, much would doubtless be gained if the present steam railways, following the example of the interurban railways, would increase the frequency and convenience of their local freight and passenger service by the use of single cars operated by electricity on their existing tracks.

CHAPTER VIII.

CONSOLIDATION OF STREET RAILWAYS.

General tendency and its results.—One of the most important factors in street railway progress has been the combination of formerly independent railways into great systems. Fifteen or twenty years ago most of our large cities were served by several separate animal-power railways. Many of the old companies operated one line only, occupying either a single street or a few streets connecting with one another, and furnishing transportation to a single section of the city. There was usually no competition between these independent companies in the matter of fares. In many instances, indeed, the opportunity for competition was slight, the areas served by the different companies overlapping but little; yet in some cases, as in New York, parallel lines existed which, to a limited extent, competed for traffic by improvements in service.

The introduction of mechanical traction, especially of electric traction, developed a much stronger tendency toward consolidation than existed before. One motive for combination was doubtless a desire to eliminate competition, for the cheapening of the cost of operation by the new method tended to increase the number of competing lines. By combination also unnecessary duplication of trackage was avoided. Even more important was the desire to reduce operating expenses. So long as each car had possessed its independent source of power, as was the case with animal traction, there was, after the system had reached a limited size, little saving in cost through doing business on a larger scale. Cable or electric power could be much more economically furnished by power plants of great capacity, capable of operating several railway lines. By consolidation, moreover, it was possible to locate the power houses in such a way as to reduce the amount of electrical or cable equipment necessary for the distribution of power, and also to save in the expense of bringing coal to the plant. A further advantage from operation under unified control was found in such instances as frequently arise in the business centers of cities, where a single track is used for cars of several different lines. If these lines were operated by separate companies it became necessary, with electric traction, either to maintain several overhead wires or to enter into complicated agreements for the assignment of the cost of power from a single wire. If operated by a consolidated company the power furnished by a single set of wires would serve, without

elaborate calculations, for the operation of all the lines. Other minor economies of a like character secured by combination do not call for discussion.

The greatest advantage of consolidation was one which accrued both to the users of the service and to the street railways themselves. The establishment of a unified system made it possible to carry passengers more nearly where they wanted to go and to carry them longer distances. In many cases these advantages were secured by modifying and extending the routes covered by single cars; in other cases transfers to connecting lines were given.¹ So long as connecting lines were operated by different companies, the use of transfers involved complication and difficulty and was rarely known. The lengthening of the possible trips, which increased the attractiveness of the street railway, so augmented the traffic that it proved decidedly profitable to the companies.

So great were these various advantages from combination found to be, that in almost every great city of the United States all, or nearly all, of the formerly independent companies have been gradually brought together into one system during the past ten or fifteen years. This has been true in Brooklyn, Baltimore, Boston, Philadelphia, Buffalo, Cincinnati, Pittsburg, Cleveland (since the census year), Detroit, St. Louis, in the urban center consisting of Jersey City, Newark, Paterson, and smaller towns, in Minneapolis and St. Paul, in New Orleans, Louisville, Milwaukee, Denver, Omaha, and in several other large cities.

In several of these cities one or more minor lines, mostly of a suburban character, are still outside the consolidation. In Manhattan and Bronx boroughs of Greater New York a single company now operates the surface railways, while another company controls all the elevated railways as well as the subway system. The greater part of the street railway traffic of San Francisco is carried by a single company recently consolidated, although several independent companies of some importance still exist. Combination has been effected to a considerable extent in Chicago, but that city still has two extensive systems of surface railways and several minor systems, as well as four elevated railways which are independent of the surface railways and

¹ See discussion of transfers, page 41.

of one another. These various lines, however, largely serve separate sections of the city. In Washington two important companies are still in independent existence.

Elsewhere has been pointed out the increase in the average importance of the individual railway companies in operation in 1902 as compared with 1890, an increase due largely to the process of consolidation. This increase in the importance of companies is still further brought out by the following table, which, for 1890 and 1902, classifies the operating companies according to the number of miles of line operated (first main track, not all tracks), and also indicates the total length of line owned by companies falling within the various groups. The figures for 1890 include only the companies for which precise returns of trackage were made.

TABLE 80.—Distribution of operating companies according to length of line: 1902 and 1890.

LENGTH OF LINE (MILES).	1902		1890	
	Number of companies.	Length of line, miles.	Number of companies.	Length of line, miles.
Total.....	817	16,651.58	691	15,119.53
Under 10.....	394	1,957.16	557	2,304.49
10 but under 20.....	219	3,148.91	99	1,353.42
20 but under 30.....	76	1,878.54	16	400.39
30 but under 40.....	34	1,197.83	7	251.74
40 but under 50.....	25	1,117.05	4	178.04
50 but under 60.....	16	892.86	2	101.57
60 but under 70.....	12	785.22	2	130.33
70 but under 80.....	7	532.46	1	76.48
80 but under 90.....	6	515.30	1	54.42
90 but under 100.....	3	277.12		
100 and over.....	25	4,349.10	2	238.65

¹ Exclusive of 663.94 miles, estimated, in 1890.

It will be seen that in 1890 more than three-fourths of all the companies had less than 10 miles of line each, and the total line of such companies was more than two-fifths of the total for the United States. In 1902, on the other hand, less than one-half of the companies were of this small size and their total length was only about one-eighth of that for the country. In 1890 there were only 8 companies with more than 50 miles of line, while in 1902 there were 69 companies of this size. In 1890 only 2 companies had more than 100 miles of line and their length was less than one-twentieth of the total. In 1902, 25 railways were more than 100 miles long and their aggregate line was considerably more than one-fourth of the total for the United States.

Methods of combination.—The three leading methods of consolidation in the street railway business have been:

(1) Merger. The properties of the former companies are bought outright, for cash or for shares of the new corporation, and the old corporations go out of existence.

(2) Lease. The controlling company takes over the entire operation of the system of the lessor, often for nine hundred and ninety-nine years, and agrees to pay

a definite rental to the lessor company, the latter continuing at least nominally in existence.

(3) Stock ownership. Purchase of all, or of a controlling interest in, the stocks of companies, which continue in existence and may even continue to maintain nominally independent operation.

In several cities, two or even all three of the above-mentioned methods of combination have been employed, more or less indiscriminately, in bringing together a single street railway system. In others, one method of combination has been followed exclusively or has predominated. State laws or municipal charters and franchises have sometimes been the determining factor as to the form of combination used.

Probably the greater number of the street railway consolidations have been effected through merger. This was the form of combination employed in most medium-sized cities. It was also the form followed, in whole or in part, by the West End Street Railway Company of Boston (which is itself now, however, leased to the Boston Elevated Railway Company), the Detroit United Railway Company, the New Orleans Railways Company, the United Railways and Electric Company of Baltimore, and others.

Consolidation by means of leases¹ is particularly common in New York and Pennsylvania, the laws of the latter state rendering other forms of consolidation less practicable. The operating company or lessee regularly assumes the indebtedness of the lessor company, and guarantees a fixed dividend on its stock, except in cases where stockholders receive no return from any source. It is quite a common arrangement that the rate of dividend guaranteed shall increase year by year from the date of the lease, till, after six, eight, or ten years, a maximum is reached which remains the basis of future payment. In a few instances the lessor companies continue, at least temporarily, to be operated separately, but usually they are as completely united with the controlling company under one management as if they had been merged with it.

The lease is sometimes used where its object is not primarily that of consolidation. Thus, the St. Louis Transit Company, in 1899, acquired by lease the United Railways Company, which had already secured control of all the street railways of the city except two or three suburban lines. So, too, the Cincinnati Traction Company recently leased the lines of the Cincinnati Street Railway Company without increasing the number of companies in the combination. The purpose in such cases may be to facilitate a change in the control of the business; or the lease may be merely a device by which, without any real change in ownership, a large part of the net earnings of the system may be given the appear-

¹ See further on this subject, pages 54, 58, 60, 65, and 80. Table 39 shows the number of nonoperating lessor companies in each state and their financial transactions.

ance of being necessary to meet fixed charges, since the operating company always treats its rentals as such.

The third method of combination, by stock ownership, while found less frequently than either of the others, is being adopted apparently as the favorite method to accomplish the greatest consolidations. Like the lease, it offers the advantage that the original companies maintain their corporate existence, upon which the validity of franchises and privileges sometimes depends. It has the further advantage that a company may be brought into combination merely by the purchase of a majority of its stock without the purchase of its entire property. For this reason this form of combination is sometimes made a preliminary step toward a later combination by merger or lease.

Companies which are already operating railways quite frequently buy a majority or the whole of the stocks of other companies in order to secure control. In such case the subsidiary company may keep up nominally independent operation, but in reality its operations are merged with those of the controlling company to whatever degree the latter desires, for the purpose of effecting economies or for other objects. Thus the Metropolitan Street Railway Company in New York (itself leased to the Interurban Street Railway Company) has for a number of years held a controlling interest in the stocks of three other railways, which it practically operated directly, although separate reports of their business were made.

The latest development in methods of consolidation is the securities company, a corporation which merely holds the stocks of operating street railways and does not itself own any tracks or conduct any operations, but receives its income from the dividends of the corporations whose stocks it holds. This method has been employed, for example, in recent great street railway combinations in New York, Brooklyn, Pittsburg, Buffalo, Minneapolis and St. Paul, and San Francisco. In some cases a holding company of this type leaves all of its subsidiary companies in separate operation, though, of course, their independence is only nominal. In several cities the holding company has placed the entire operation of the plants which it controls in the hands of a single one of the subsidiary companies. Thus the Philadelphia Company, of Pittsburg, which, besides holding practically all the street railways of that city and vicinity by stock ownership or lease, also controls gas, electric light, and other properties in the same way, has handed over the operation of its street railway system to the Pittsburg Railways Company, specially chartered for that purpose. A similar arrangement exists between the International Traction Company of Buffalo, a holding company, and the International Railway Company, which operates its lines. The consolidation in San Francisco took the same form.

An interesting recent development is that of bringing together under common ownership street railway

lines widely separated from one another. Comparatively little of the advantage of combination between connecting or competing lines is secured in such case. There may be some slight economy in doing away with unnecessary superior officers, and methods of operation may be improved by reason of the superior capacity and experience of the officers of the central company. The chief object in the formation of such companies, however, is to furnish a convenient form of investment to capitalists. Instead of individually buying the securities of railway companies situated, perhaps, in distant sections of the country, with whose operations they could have little familiarity, investors form a holding company, with officers whose duty it is to represent their interests and watch the management of all the different railways.

Holding companies of this type have been developed to a greater extent in Philadelphia than anywhere else. The Interstate Railways Company, which succeeded the United Power and Transportation Company in 1902, controls about 15 street railway systems in Pennsylvania, New Jersey, and Delaware, together with 2 electric light companies. It has also acquired the stock and franchises of numerous new railway companies. Some of the lines controlled are more or less closely connected, and others may be brought into connection later, but the primary purpose has been, apparently, not so much to make a single great system as to provide a convenient form of investment. The American Railways Company of Philadelphia controls 8 or 9 widely separated street railways and lighting plants in Ohio, Illinois, New Jersey, and Pennsylvania, and also a minority interest in the stock of the Chicago Union Traction Company. The Railways Company General controls stocks of 7 railway lines, and lighting plants in New York, Pennsylvania, and Michigan.

The United Gas Improvement Company, of Philadelphia, has recently extended its investments into the street railway field. This company operates the Philadelphia Gas Works and controls, in one way or another, the gas and electric light properties in more than thirty cities of the United States. One of its subsidiary corporations is the Connecticut Railway and Lighting Company, which in 1900 secured control of street railways serving a dozen different towns and cities in Connecticut, including about 160 miles of track, or more than one-fourth of the entire trackage of the state. The Connecticut Railway and Lighting Company also operates water, gas, and electric light plants. The United Gas Improvement Company in 1902 secured control of almost the entire street railway system of Rhode Island. Its relation to its subordinate companies in that state is peculiarly complicated. A corporation known as the United Traction and Electric Company, chartered in New Jersey, owns the stocks of the three leading street railway companies of Rhode Island. These companies, however, are leased to the Rhode Island Company, an

operating corporation created in 1902 by special act of the Rhode Island legislature, which has agreed to pay a rental sufficient to provide the United Traction and Electric Company with interest on its bonds and 5 per cent dividends on its stock. This rental is guaranteed by the United Gas Improvement Company, which is the promoter of the entire combination. Finally, the stock of the Rhode Island Company is owned by the Rhode Island Securities Company, a New Jersey corporation, through which the United Gas Improvement Company exercises its control. The street railway trackage in this combination amounts to about 270 miles. The Rhode Island Securities Company is also acquiring gas and electric light properties in this same territory. In 1903 a consolidation of nearly the entire gas, street railway, and electric light business of northern New Jersey was effected under the name of the Public Service Corporation, and this company is said to be affiliated with the United Gas Improvement Company.

Centralized ownership of street railway properties has also been brought about in a number of instances without the intervention of formally organized companies. The very wide reaching street railway investments of the so-called Whitney-Elkins-Widener syndicate is the most important instance. A number of banking firms in eastern cities control, in the interest of their clients, several railway and lighting plants in scattered localities.

A combination of somewhat unusual form is that known as the Massachusetts Electric Companies, formed in 1899. This is not an incorporated company, but a voluntary association managed by a number of trustees, who hold title to the stocks of street railways and electric light plants, and who have issued trust certificates, common and preferred, to the amount of about \$35,000,000. This association has bought up the securities of thirty or forty companies originally separate and has consolidated most of them into three operating companies—the Boston and Northern Street Railway Company, the Old Colony Street Railway Company, and the Hyde Park Electric Light Company. The street railways controlled have more than 850 miles of track, including nearly all the lines in eastern Massachusetts outside of the city of Boston. This combination has aimed to establish a unified system of transportation out of the formerly disconnected lines. It has been able through combination to realize important economies, as well as to give advantages to the public. The Boston Suburban Electric Companies is a less important combination of the same character.

Street railway consolidation in New York city.—The recent history of the surface railways of New York city illustrates strikingly the strength of the tendency toward consolidation, and likewise furnishes examples of all the different methods of combination which have been described. In 1890 the surface railway business of the present borough of Manhattan was in the hands

of about fifteen independent operating companies, no one of which controlled more than 30 miles of track, out of a total length of about 210 miles. Consolidation had begun even before this time, but had not gone far. The Broadway and Seventh Avenue Railway had leased the newly established cable system of the Broadway Surface Railway, and also the South Ferry Railway, so that it had a continuous line on Broadway and Seventh avenue, forming a great central stem to which branch lines could be attached with advantage. The Twenty-third Street Railway had, as far back as 1876, leased the Bleecker Street and Fulton Ferry line. Half a dozen of the great longitudinal avenues of the city, however, were still occupied by as many independent street railway lines.

The first important step toward general consolidation was taken in 1891 by the organization of the Metropolitan Traction Company, which was a stockholding corporation only. Within two years it had secured a controlling interest in the stocks of more than one-half of the surface railway companies. In 1893 the Metropolitan Street Railway Company was organized as an operating company, subordinate to the traction company. This company took over the Houston, West Street and Pavonia Ferry line and the Broadway Surface and South Ferry lines. In the following two years the new cable railways of the Metropolitan Crosstown, the Lexington Avenue and Pavonia Ferry, and the Columbus and Ninth Avenue companies were also absorbed in the Metropolitan Street Railway Company. Meantime, the latter company leased the older lines of the Broadway and Seventh Avenue, the Forty-second Street and Grand Street Ferry, the Central Park, North and East River, the Bleecker Street and Fulton Ferry, the Twenty-third Street, the Ninth Avenue, and the Sixth Avenue companies, whose stocks were said to be largely owned by the traction company. By 1895 the system controlled by the Metropolitan Traction Company included 132 miles of track out of an entire trackage of surface railways in Manhattan borough of 286 miles. It owned all the important longitudinal railways except those on Second, Third, Fourth, and Eighth avenues.

The progress of consolidation for some years after 1894 was less rapid. In 1896 the street railway lines of the New York and Harlem Railroad Company (Fourth and Madison avenues), and the Eighth Avenue line, and in 1898 the Second Avenue Railway, were leased to the Metropolitan Street Railway Company. Several new railways were constructed during these years, separate charters being taken out for the purpose of securing the franchises. The stocks of the corporations operating these new lines—the Twenty-eighth and Twenty-ninth Streets Crosstown, the Thirty-fourth Street, the Thirty-fourth Street Ferry and Eleventh Avenue, and the Fulton Street Railway companies—were all held by the Metropolitan Traction Company. In 1897 the traction company bought control

of the Central Crosstown Railroad Company, to which the Christopher and Tenth Street line had previously been leased. Four of these last-mentioned companies have continued to operate separately. In 1898 the Metropolitan Traction Company, having fulfilled its object of securing control by stock purchase, was dissolved, and the securities held by it became the property of the operating company, the Metropolitan Street Railway Company.

At the beginning of 1900 this company found only one important competitor still in existence, the Third Avenue Railroad Company. As far back as 1895 the Third Avenue Company had begun to realize that to maintain its position it must secure branch and connecting lines. It accordingly bought a controlling interest in the extensive Forty-second Street, Manhattanville and St. Nicholas Avenue Railway in the upper west side of the city. In 1897 it similarly obtained control of the Dry Dock, East Broadway and Battery Company, with an extensive system of horse lines in the lower part of the island. In the next year the Third Avenue Railroad bought a majority of the stock of the Union Railway Company, which had grown up by the gradual consolidation of a dozen or more companies and which operated 50 miles of track in Bronx borough and the adjacent parts of Westchester county. In 1899 the Third Avenue Company bought up the Tarrytown, White Plains and Mamaroneck Railway and the Yonkers Railroad, which added a large amount of track to its system in Westchester county.

At the beginning of 1900 the Third Avenue Railroad Company controlled more than 200 miles of track, or nearly as much as that of the Metropolitan Street Railway system. Considerably less than half of this trackage, however, was in Manhattan borough, while nearly all that of the Metropolitan system was included within that borough. With the adoption of underground electric traction the Third Avenue system seemed likely to become a very serious competitor of the older combination. The officers of the Metropolitan Street Railway Company took advantage of a heavy fall in the stocks of the Third Avenue Company, due to difficulty in meeting the wasteful expense connected with its installation of electric traction, to buy in open market a controlling interest in the stock of its rival. Soon thereafter the Metropolitan took over the Third Avenue Company by lease, but for the time being it has maintained the separate operation of the lines of that company and of those of each of its subsidiary corporations, paying them the amount of their net earnings as a rental.

In 1902 a still further combination was effected. The Interurban Street Railway Company¹ had been formed in 1901 to construct new trolley lines in the borough of Bronx and in Westchester county, for which it held extensive franchise rights. This company now leased

the entire Metropolitan Street Railway system, assuming all the indebtedness and agreeing to pay a rental of 7 per cent on the \$52,000,000 of stock. At the same time the Metropolitan Securities Company was formed, under the business-corporation law of New York. This holding company owns all of the shares of the Interurban Street Railway Company, and thus has ultimate control of the entire surface railway system of Manhattan and Bronx boroughs and the adjacent territory. For a long time to come by far the greater part of the profits of the street railways in this combination will be devoted to rental payments on the immense amount of stock and bonds of the various lessor and sublessor companies.

No form of combination has yet been effected between the elevated railways and the surface lines of Manhattan borough; although several years ago the Third Avenue Railroad entered into an operating agreement with the Manhattan Railway (elevated) by which, on payment of 3 cents in addition to the regular fare, a passenger on either system could transfer to the other. It is significant, however, that in 1903 the elevated railway company was merged with the company which constructed the new underground transit system, the Interborough Rapid Transit Company. The elevated system itself is the result of a consolidation of three companies.

The process of consolidation in Brooklyn has paralleled that of Manhattan. By merger, lease, and ownership of securities, both the elevated and the surface lines have been brought together under the Brooklyn Rapid Transit Company, which controls at present more than 500 miles of track.

The process of consolidation in Greater New York has been contemporaneous with great changes and improvements in methods of operation. It is therefore impossible to judge from statistics the degree to which consolidation has increased traffic or reduced operating expenses. That it has done much in both directions is beyond question. The changes in the routing of cars and the extension of the transfer privilege have materially increased the attractiveness of the service.

*Street railway consolidation in Philadelphia.*²—The process of street railway combination in Philadelphia began earlier and was completed earlier than in New York. During the period from 1857 to 1874 about 40 separate companies were given charters in Philadelphia. In 1876 there were in existence 17 separate companies, operating altogether 289 miles of track. It appears that from 1859 on the companies had largely acted in harmony so far as the fixing of fares and the like were concerned, through an organization known as "The Board of Presidents of City Passenger Railway Companies." In 1879 and 1880 the process of combination began by the lease

¹The name of this company has since been changed to New York City Street Railway Company.

²Based largely on the monograph, *The Street Railways of Philadelphia*, by F. W. Spiers, published by Johns Hopkins University.

of two or three extensive lines to the Union Passenger Railway Company. In the next year three other roads were brought together into the People's Passenger Railway Company. These two systems carried about two-fifths of the entire number of passengers in the city. In 1883 the Philadelphia Traction Company was formed by men who have since extended their street railway interests into many cities of the United States. This company never owned any track, but gradually extended its control by means of leases. The Union system, already described, was the first to be leased to the Philadelphia Traction Company. In 1887 an act was passed by the state legislature for the purpose of facilitating the combination of street railways, which provided special powers for what were legally known as "traction companies." The People's Traction Company, which was soon organized under this act, leased the People's Passenger Railway Company, as well as a number of other formerly independent railways. The Philadelphia Traction Company continued to absorb additional lines. The movement was favored by the change from horse to electric power. By 1895 practically all the street railways of the city had been brought together into four systems. The Philadelphia Traction Company controlled 203 miles of track; the Electric Traction Company, 130 miles; the People's Traction Company, 73 miles; and the Hestonville, Mantua and Fairmount Passenger Railway Company, 24 miles.

The time had now arrived for complete consolidation. The new Union Traction Company, under sanction of the act already mentioned, took over all of the stock of the Electric Traction Company and the People's Traction Company, issuing in exchange therefor trust certificates bearing 4 per cent interest. It also took over by lease the Philadelphia Traction Company, and, in 1898, the Hestonville, Mantua and Fairmount Passenger Railway Company. The lines of the Electric Traction Company and the People's Traction Company were also leased to the Union Traction Company, thus giving a double form of control.

In 1901, by special act of the state legislature and by ordinance of the Philadelphia city council, a large number of interrelated franchises were granted to a new syndicate, which proceeded under them to organize various companies to construct surface, elevated, and underground railways. It was the intention that these new lines should constitute a competing system. In 1902, however, the Philadelphia Rapid Transit Company was organized, which acquired all of the stock and franchises of the new companies, and also took over by lease the entire existing system of the Union Traction Company, agreeing to pay therefor a rental on the par value of its \$30,000,000 of stock (of which only \$10,500,000 was paid in). This rental was 3 per cent at the beginning, and is to increase by 1 per cent every two years until 6 per cent is reached. The Philadelphia Rapid Transit Company has also secured control of the Doylestown and Willowgrove Railway Company, operating in the suburbs of Philadelphia, and it is quite possible that further consolidation with suburban companies may take place in the future.

The complexity of the process of consolidation in Philadelphia may be seen from the list, on page 264, of companies united under the Union Traction Company. Thirty-nine companies altogether are enumerated in this list, and their relations to one another are shown by the degree of indentation. The form of combination universally employed is the lease, though in many cases it is supplemented by ownership of part or all of the shares of the lessor company by the controlling company. The table shows, for example, that the Philadelphia and Darby Railroad Company was leased to the Philadelphia City Passenger Railway Company. The latter was subsequently leased to the West Philadelphia Passenger Railway Company, which became later a lessor to the Philadelphia Traction Company. The last-named company was leased to the Union Traction Company, which, as already stated, is now a lessor to the Philadelphia Rapid Transit Company, thus making six stages in the process.

CHAPTER IX.

FRANCHISES, PUBLIC REGULATION, AND PUBLIC OWNERSHIP.

During recent years widespread and active interest has been manifested in the relations between street railway companies and the local governments representing the interests of the people. Two peculiarities of urban railways bring this relation into special prominence and justify reasonable public regulation. The first is the fact that the railway in urban communities usually occupies public streets and ways. The second is the tendency of the street railway business toward monopoly, a tendency which has been abundantly demonstrated by experience. With the growth of population a constantly increasing proportion of the people in the cities are forced to patronize the railways, and the need of protection against the possible abuse of monopoly power correspondingly increases.

The actual regulations in force with regard to the operation of street railways differ widely among the different states. Indeed, they vary almost as widely among different companies in the same state or even in the same city. For the purpose of ascertaining more fully the provisions of state and local legislation with respect to street railways, the Bureau of the Census included in its general schedule addressed to the street railway companies several questions regarding their franchises. It also addressed inquiries to the mayors of a large number of municipalities, including one or more in every state and all the largest cities. Much valuable information was received in response to these inquiries, especially from the mayors. Copies of city charters and of franchise ordinances were furnished in many instances. It was impracticable to attempt to learn in detail the provisions of every local franchise, as many consolidated companies are operating under a score or more of separate grants with widely varying terms. In the detailed presentation by states in the latter part of this chapter the aim has been to set forth the present policy of leading states and cities, as shown in existing statutes and in recently granted franchises, while only more general statements are made in relation to earlier franchises which are still in force. In this presentation only questions bearing upon the fundamental relations between the street railway companies and the governing authorities or the people are taken up. The most important subjects covered are the methods of granting franchises and their duration, the regulation of fares, and the requirements regarding

compensation for franchise privileges. No attempt is made to present the less essential features of the law regarding the organization, management, and powers of street railway companies, or the details of local ordinances regarding car schedules, methods of construction, safety regulations, and the like.

I.

METHOD OF GRANTING FRANCHISES.

Authority of state and municipal governments.—Street railway companies, like other corporations, derive their charters, which give them the right to exist and which regulate in a general way their internal government, from the state, either through general or special statute. The privilege of occupying a specific street or highway usually requires further authorization, and it is this authorization which is designated by the term "franchise" in the more limited sense. In some state constitutions the legislature is expressly prohibited from granting the use of the streets and highways without the consent of the local governing authorities, while in nearly all other states the practice of the legislature is to give the local governments control in this respect. This control involves ordinarily the right of the local authorities to impose such conditions as they may see fit at the time the franchise is granted. In the detailed presentation of street railway law in section VII only deviations from this rule are mentioned.

So far as recent practice is concerned, such deviations are mostly confined to the New England states, where a large proportion of the street railway companies have been chartered by special acts of the legislature. Many of these charters have given to companies the use of the streets with no provision for interference by the local authorities further than was necessary to regulate the details of construction and make them conform to the grade and surface of the streets. This policy has been particularly common in Connecticut and Rhode Island. In Massachusetts the railroad commission must approve all grants of franchises by local authorities; moreover, where a street railway is designed to serve several towns or cities, those towns which favor a franchise may appeal to the state board of railroad commissioners if any one of the local governments withholds its consent. This latter proviso was inserted in the law

on the recommendation of a special committee on the relations between cities and towns and street railways, which reported to the Massachusetts legislature in 1898.¹ In New York, Connecticut, Rhode Island, Maine, New Hampshire, and one or two other states the state railroad commission has also some control over the construction of street railways, but this control is of a less thorough character than in Massachusetts.

It is quite common for the state, by general or special statute, and sometimes by its constitution, to regulate the procedure which must be followed by the local governments in granting franchises to street railway companies. Often these regulations apply to other classes of public utilities also. The corruption which has often characterized the action of municipal authorities in bestowing franchises has been one of the motives for the adoption of safeguards concerning procedure.

In many cases a larger proportion of the city council, or other local governing body, is required to pass a franchise ordinance than to pass ordinances on most other subjects. Provisions of this character are so common that, with a few exceptions, they have been omitted in the detailed statement in another part of this chapter. One of the most stringent regulations concerning the procedure in granting franchises is found in the New York city charter. Not only is the vote of three-fourths of all the members elected to the city council required, but the grant must also be approved by the board of estimate and apportionment, a small body chiefly composed of executive officials, which has the main control over the city's finances. This board is directed particularly to inquire into the value of the privileges conferred and the adequacy of the compensation offered for them. A precisely similar method is prescribed in the charter of the city of Baltimore.

In most states the law does not distinguish between ordinary urban street railways and interurban electric lines, either as to the methods of securing privileges or as to the general regulation of business. In those states where interurban railways are most highly developed, however, they have either been placed under the same laws as steam railways or under special laws more akin to those governing steam railways.

Consent of voters or of abutting owners.—The movement in favor of "direct legislation" has led to the requirement, in various states and cities, that franchises shall be submitted to popular vote, either in all cases, or on petition of a certain proportion of the voters. Such use of the referendum is most common in the Western states. In Colorado, South Dakota, and

Utah, for example, all municipal ordinances are subject to the referendum on petition, or the optional referendum, as it is commonly called. The same requirement is found in the San Francisco charter, and in the charters of various other cities. In Nebraska and Arizona all public franchises in cities must be submitted to popular vote; in Montana and Colorado to the vote of the taxpaying electors. In Iowa one-fifth of the voters in any city may require any franchise to be submitted to popular vote. The optional referendum with reference to franchises exists in incorporated towns in Indiana, in Parkersburg, W. Va., by its new charter, and in various other places. In Detroit a local ordinance provides that proposed franchises shall be submitted to popular vote, but such vote is purely advisory, not binding. Provisions for popular vote on franchise grants are for the most part of recent origin, and there is comparatively little experience as to their practical working. The fear has sometimes been expressed that the people will be unduly hostile to the corporations, and will ignorantly deprive themselves of needed facilities by refusing franchises altogether, or by insisting upon impossible conditions.

Somewhat similar to the requirement of a popular vote for the grant of street railway franchises is the provision in a number of states that the consent of the owners of abutting property shall be secured. Usually the provision is that the owners of more than half of the frontage must give their consent. This is true, for example, of all cities in Colorado, Missouri, Nebraska, New Jersey, and Ohio, and of cities of more than 40,000 inhabitants in Kansas. The same requirement existed in Illinois prior to 1899. In Louisiana one-half in number of the owners of abutting property and the owners of one-half in value of the property must consent to the construction of the railway. In New York the owners of one-half in value of the property must consent, but there is a proviso that if the necessary consent can not be obtained appeal may be taken to the courts, which shall decide whether there is public necessity for the railway. This proviso was enacted in recognition of the fact that the rights of the people, as a whole, are paramount to those of the property owners upon the streets directly concerned. In some cases, moreover, the owners of property, particularly if the streets were peculiarly desirable or necessary for the construction of a general railway line, or of a connecting link in a system, might take unfair advantage of their position to demand excessive compensation from the railway company as a condition of their consent. This does not imply that any compensation whatever would necessarily be excessive, for it is entirely proper that a railway company should compensate property owners for actual damage to their property or decrease in its value, and provisions of this sort are almost universally found in state laws or in local

¹ Report of the special committee appointed to investigate the relations between cities and towns and street railway companies, 1898. This report presents, among other valuable matters, a summary of the legislation regarding street railways in the various states and of the franchise provisions in the leading cities. It is frequently referred to in the following discussion, being cited, for convenience, as "Massachusetts Report."

ordinances and franchises. In Massachusetts the rights of owners of abutting property are protected by provisions for appeal to the state railroad commission.

Competitive bidding for franchises.—During recent years it has become quite common, with a view to obtain more favorable terms, to offer franchises at public competition. This requirement often applies to other classes of public utilities as well as to street railways. In California, Nevada, Kentucky, and Virginia the general state laws require competitive bidding, but contain no provision specifying the character of the bids, which apparently might, at the discretion of the local authorities, be either in the form of lump sums or of annual payments. In New York and Louisiana the bids must be on the basis of a percentage of the gross annual earnings. In Ohio the franchise must be granted to the bidder offering the lowest rates of fare. A similar method is required by the individual charters of certain cities, and in a few others it has been adopted voluntarily by local authorities. The city ordinarily reserves the right to reject all bids. In Virginia the local authorities may, if for any reason they deem it to be for the interests of the people, grant the franchise to some other than the highest bidder, but they must give their reasons for the grant in the franchise ordinance.

In most states there has been as yet comparatively little experience with the working of the method of competitive bidding for public franchises. The method has, however, been employed long enough in California, New York, and Ohio to afford a fair basis for a judgment as to its success. In two or three instances there has been active competition for street railway franchises in New York city, but for one reason or another the franchise grants made as a result of high bids have been set aside or the railways authorized have never been built.¹ In one case the bids for a certain extension were run up until seventy times the total gross receipts of the proposed new line were offered in payment for the franchise. This absurd procedure, which was obviously not in good faith, was stopped by an injunction. Finally the franchise was sold for 100 per cent of the gross receipts, but the road has not yet been constructed. In fact the highest compensation which has actually been paid to the city treasury as the result of competitive bids for street railway franchises is 8 per cent of the gross receipts.² It is probable that competition had something to do with enabling the city of Columbus to obtain unusually low fares as a condition precedent to the extension of the franchise of the leading railway in that city.

Generally speaking, however, there has been little or no competition for franchises, and the local govern-

ments have obtained no more favorable terms than were prescribed as a minimum by state or local legislation. The reason is obvious. The proposed franchise is almost invariably petitioned for in the first instance by a duly organized corporation, which asks the right to occupy specifically named streets and which has carefully considered, in advance, construction plans and probable financial results. Even when a considerable period of time is allowed for others to investigate the proposed plan and to estimate the value of the franchise, these possible competitors are at a great disadvantage as compared with the original promoters. It often happens that there are few people in a city who are familiar with the street railway business and at the same time in command of the necessary capital. Effective competition is still less likely when the proposed railway is in the nature of an extension or outlying line, the success of which will depend almost wholly upon cooperation with existing lines. The process of consolidation among street railways has gone so far in most large cities that there is only one important system in existence with which a new railway can be connected.

The method of competitive bids is apt to prove of greater value when applied to renewals of the franchises of existing railway systems. It has already been so applied in a few instances, and under existing laws will apply to many such renewals in the future. Of course the old corporation has a great advantage in the competition for a renewal of the franchises; but the value of the privilege is so much better appreciated and so much more easily measured than in the case of a new railway that other capitalists will often stand ready to offer such competition as will at least compel the present owners to make important concessions to the people. The best results, however, are secured where the system of competitive bids is supplemented by careful bargaining on the part of the local authorities. This method is provided for in the charter of New York city. If the board of estimate and apportionment receives no satisfactory bid for a franchise, it becomes its duty to seek better terms by negotiation. In two or three cases the efforts of the board have resulted in securing a compensation for street railway franchises considerably in excess of that originally offered.³ The New York system in this respect has been copied by Baltimore.

II.

DURATION OF FRANCHISES.

State constitutions or laws usually, though by no means always, limit the duration of corporate charters of all classes. Such limitations, however, are ordinarily of a formal character, and unless some action to the contrary is taken by the state legislature at the

¹See G. Myers, in "Municipal Affairs," March, 1900, page 150 ff.

²For the Metropolitan Crosstown Railway. See Report of the Comptroller of the City of New York, 1902; Myers, loc. cit., page 162.

³Myers, loc. cit., page 155.

time of expiration, a charter can usually be renewed by a simple procedure on the part of the stockholders of the corporation. Nevertheless, the limitation on the duration of the charter offers to the state the possibility of imposing new restrictions if it so desires.

Most states, including those which limit the duration of corporate charters, provide in their constitutions that the legislature shall have the right to repeal or amend any general or special incorporation law if passed subsequent to the adoption of the constitution. This provision has been inserted in view of the judicial doctrine announced in the famous Dartmouth College case that, in the absence of such provision, an act conferring privileges upon a private corporation constitutes a contract on the part of the state. It is probably safe to say that nearly all important street railway companies in the United States hold charters which are either limited in duration or subject to amendment or repeal by the state legislature. In case of such amendment or repeal, however, the courts are disposed to require that regard be given to vested property rights, and the legislature is subject to limitations in those states whose constitutions prohibit special and local legislation, and in which, accordingly, changes must apply to an entire class.¹

Limitations on the duration of local franchises are another matter. State constitutions or laws seldom reserve to the state or local authorities the right to terminate a franchise, or to revise its provisions during the prescribed term, nor have the local authorities in granting franchises ordinarily reserved this right.

The most important exception to the statement just made is found in Massachusetts. For a long time it has been the policy in that commonwealth to grant street railway and other franchises for an indefinite term, subject to revocation either by the state or by the local governments. The Massachusetts committee on street railways of 1898, whose report has already been referred to, characterized this system as utterly illogical in principle; but asserted that, because of the conservatism of the governing authorities in the state, it had not resulted, as might have been expected, in hindering the development of public service corporations. The committee found, on the contrary, that the street railway companies preferred this plan to one by which their franchises would be terminated after a period of years. The law was, however, amended on the recommendation of the committee, so as to require the approval of the railroad commission for the revocation of a "location."

Many street railway franchises, particularly those of early date, are perpetual, and there is no state or local provision under which they can be revoked or amended. Where, however, a corporation whose charter is subject to revocation or amendment holds such an unlim-

ited franchise, the state legislature can virtually annul it, or change the terms of the franchise, through its control over corporate existence. Even if both the charter and the franchise of a public service company are unlimited in duration, the state may, subject perhaps to certain self-imposed limitations, exercise, directly or through local governments, its right of eminent domain to purchase the property for public use. The payment in such a case would ordinarily include not merely the tangible value but the full franchise value. Several state constitutions contain clauses providing that the public authorities shall always reserve the right of eminent domain over the property and franchises of corporations. Such provisions, however, merely declare a generally recognized principle. A constitutional amendment in Colorado, adopted in 1902, confers upon municipalities the right of eminent domain over "public utilities," and similar provisions are found in the statutes of a few states.

Franchises which are perpetual, and not subject to modification by the local authorities, are still permitted by the state laws of New York (except as regards certain cities), New Jersey, Pennsylvania, Missouri, Indiana, all of the New England states, and a few others. Many of the most important franchises in the largest cities of the country are perpetual, and can not be modified by the local governments. In a majority of states the present policy is to limit the duration of street railway franchises by state law. The limit of life is ninety-nine years in Louisiana (the law applying only to parishes), fifty years in Arizona, Idaho, and second-class cities of New York, and by special act (the constitutionality of which is in litigation) in Cincinnati, Ohio; thirty years in Michigan, Virginia, Alabama, and Florida; twenty-five years in Ohio, Iowa (in cities under special charters), San Francisco, Cal., St. Paul, Minn., and Portland, Oreg.; twenty years in Illinois, Kentucky, Nevada, South Dakota, and Montana; and ten years in Wyoming. There is apparently a tendency to shorten the duration of franchises, the more recent enactments usually prescribing the shorter periods. In many cases cities have limited the life of franchises where no state restriction existed, or have fixed terms shorter than those prescribed by state law.

One modification of the limited franchise is that which contains in the original instrument provision for renewal with revised terms. By the charter of New York city and that of Baltimore, the original grant of a franchise, which is limited to twenty-five years, may provide for renewal for a further period not to exceed twenty-five years, with a readjustment of the conditions of the contract, to be made by bargaining or by appraisal. In Cincinnati the fifty-year franchise, passed under authority of the act above mentioned, permits the city to change the fares after twenty years and again fifteen years later, but at no other times. Such an arrangement increases the security of the street railway com-

¹ Central Trust Company v. Citizens Street Railway Company, 82 Fed. Rep., 1.

pany and renders it more willing to introduce the best and most expensive construction and equipment.

Ordinarily, the local authorities are permitted to renew franchises at their expiration by the same procedure as is required for original grants.

Usually the laws limiting the term of franchises contain no provision regarding the disposition of the tangible property of the holder of the franchise at its expiration. Most franchises for street railways also have no provision on this subject, except the requirement that at the expiration of the franchise the company shall remove its tracks from the streets. In practice, such an arrangement has less of a tendency to check improvements than might be expected. Before the expiration of the old franchise the local authorities very frequently make new grants to existing companies, and the compensation demanded for these grants has not, as a rule, been excessive. Corporations have often anticipated such liberal treatment and have made improvements in their property even near the close of the term of the franchise. In some cases, where changes in methods of traction, consolidations, or extensions of existing railway lines have been desired, the local governments have granted new franchises long before the expiration of the old ones. By the laws of a few states the extension or renewal of franchises is not permitted until within a short time before the expiration of the existing grant. This restriction is designed to prevent corruption, but it would seem the part of wisdom to modify it in such a way as, under careful restrictions, to permit new grants when necessary to take advantage of improved methods or to secure needed extensions.

The difficulties growing out of limited franchises have led to the adoption in several recent statutes of provisions for compensating the holders for the value of their tangible property at the expiration of the franchise term. Such an arrangement seems the more desirable in cases where local governments are by law prohibited from granting renewals of franchises directly to the existing companies, and are either required to take over the property or to dispose of the franchises by competitive bids. In Indianapolis, Ind., Baltimore, Md., Portland, Oreg., and elsewhere, municipal charters, or other state laws, provide that if the city takes possession of a street railway at the end of its franchise it must pay the appraised valuation of the tangible property, but must pay nothing for the franchise itself. By general law in Virginia and by the Greater New York charter it is provided that the original franchise must specifically state whether, at its expiration, the city shall pay for the tangible property or shall receive it without compensation. In San Francisco, on the other hand, the city charter requires that the property of all corporations to which franchises shall hereafter be given shall revert to the city without compensation at the end of the prescribed period. In Indianapolis,

Ind., and Portland, Oreg., where competitive bidding for the renewal of franchises is required, it is specifically provided that, if the grant is made to another person or corporation, the new grantee must buy the tangible property of the former holder at its appraised valuation. The same requirement is probably intended in the Virginia law and in the Baltimore charter, by which competitive bidding is also required. An arrangement of this sort has the great merit that it largely removes the discouragement to improvements which is otherwise characteristic of limited franchises.

III.

REGULATION OF STREET RAILWAY FARES.

In a considerable number of states the legislature has enacted laws limiting the fares of street railways throughout the state or in individual cities. With few exceptions the maximum fare thus fixed is 5 cents. Thus, in New York no railway built after 1884 may charge more than 5 cents for a ride over its lines within the boundaries of any municipality, a provision which is held to require the issue of transfers on its lines wherever they are necessary to reach the desired destination. In nearly all local franchises limitations are imposed in advance upon the fares. Usually neither the state nor the local government reserves the right to change these limitations during the term of a franchise. This is so generally true that in the detailed presentation by states only departures from this rule are noted. In a large majority of cases the maximum fare provided in local franchises is 5 cents, and it has not been deemed necessary to mention the limitations unless lower fares are prescribed.

Several states, by constitution or statute, have reserved to themselves the right to regulate street railway fares at any time. This is true in New York as regards all railways built since 1884. Moreover, it is generally held that unless the state clearly waives or limits this power, the general authority to regulate common carriers and their charges gives the state this power over street railways in any case. The general municipal corporations act of Illinois confers the power to regulate hackmen, truckmen, and "all others pursuing like occupations." This has been held by the supreme court of Illinois to permit cities to fix street railway fares, and Chicago and several other cities have accordingly done so. (See page 42.) Provisions of somewhat similar character are found in the special or general municipal laws of various other states, but they have not usually been interpreted as applying to the street railways.

The cities of Nebraska and the cities of more than 100,000 inhabitants in Missouri, by the general laws of these states, and the city of San Francisco by its municipal charter, have the right to regulate railway fares at any time. All these cities, however, with the excep-

tion of San Francisco, where such waiver is expressly prohibited, could probably waive the right at the time that the franchise is granted.

In Massachusetts the city council or board of selectmen of a town may petition the state board of railroad commissioners to revise the fares of any company, but it may not reduce them below the average fare charged by other companies in the state operating under similar conditions. With the aid of the reserve power of the legislature in this state it is possible that, at some future time, fares may be reduced either generally or in individual cities; but as yet there have been no important instances of the exercise of this authority.

In Part I, Chapter III, will be found a summary of the facts with regard to street railway fares in the United States. In many, if not in most instances where a fare of less than 5 cents is found, it has been secured by the action of the local governments, usually being demanded as a condition precedent to the grant of franchises, renewals, or additional privileges. In some instances, however, companies have voluntarily reduced their fares, and often they have, on their own initiative, granted or increased transfer privileges. The situation regarding fares in Columbus and Cleveland, Ohio, and Detroit, Mich., more fully described on pages 142 and 145, illustrates particularly the activity of local governments in seeking to reduce fares.

IV.

COMPENSATION FOR FRANCHISE PRIVILEGES.

The growing recognition of the value of the privileges conferred upon street railway companies, particularly in the larger cities, is manifested in the many recent laws and franchises which require special payments to the local governments. Payments which are distinctly designed as a compensation for the peculiar privileges bestowed are in principle sharply differentiated from ordinary taxes upon the property or business of street railways, which seek merely to obtain from them a contribution equivalent to that demanded from other forms of property and business. Taxes in the strict sense are imposed by virtue of sovereign power and are independent of the terms of charters and franchises; while, generally speaking, payments for franchise privileges rest upon contract with the corporations. It may readily happen, however, that the ordinary taxes on street railways in some cities represent a relatively heavier burden than the taxes and the franchise payments combined in other cities.

It is not the purpose of this report to enter fully into the complex subject of general taxation as applied to street railway corporations. In view of the interest which attaches to the methods of taxing such corporations in Massachusetts and New York, however, a brief description of them is given elsewhere (pages 141 and 144). In Part I, Chapter V, will be found general sta-

tistics showing the contributions of railways to the state and local governments, but these statistics do not distinguish between taxes proper and special franchise payments.

A considerable difference of opinion prevails as to whether a local government more truly promotes the public welfare by obtaining from street railway corporations, in return for franchise privileges, low rates of fare for railway patrons or larger cash payments into the city treasury which will reduce the burden of general taxation. The same question arises in fixing the charges of a public utility of any class which is operated by a municipality directly. The opinion seems to be gaining ground, as is seen in various laws and franchises of recent date, that the social benefits which accrue from low fares on street railways are so great that the public interest is better served by seeking reductions in charges than by seeking high financial compensation. As a matter of fact, in most of the important cases where special franchise payments of significant amount are required from street railways, the fare charged is 5 cents, while in the cities where lower fares are found, compensation for franchises is seldom paid to the public treasury.

The authority of the state or local government with regard to special franchise payments rests on essentially the same principles as the authority with regard to fares, and is more fully discussed below. However, the power is not usually reserved, either by state law or by the terms of franchises, to change the requirements concerning compensation during the life of the grant.

Car licenses.—The statement just made does not always hold true with regard to license fees, the local authorities being sometimes empowered to collect such fees at rates which they may prescribe from time to time. License fees are usually a fixed amount per car, sometimes per pole or per mile of track. The theory is that the license fee, like that, for example, on hackmen, hucksters, and those pursuing similar occupations, is intended for regulation rather than for revenue.¹ Presumably the courts would not uphold a municipality in an attempt to impose an exceedingly heavy fee. Indeed, the state law or the local franchise ordinance often limits the amount of the license fee.

License fees of one kind or another are collected from street railway companies in a large number of cities. They are particularly common in the Southern states, where licenses are commonly employed as a method of taxing all kinds of occupations. In New York, Chicago, and Philadelphia the car licenses are \$50 yearly and in St. Louis \$25. In most other important Northern cities the fees are lower. In Cincinnati, at least formerly, and in one or two other places the license is based, not on the number of cars, but on the total length of the cars used, the idea being that a large

¹ See, for example, the New Jersey law referred to on page 143.

car should properly pay more than a small one. In some cases car licenses are based on the total number of cars owned, in others on the average number in use daily during the year. The latter method would seem to be preferable, especially where a different type of car is used for summer travel, since such cars lie idle for a good portion of the year. An objection to car licenses lies in the possibility that they may reduce the number of cars operated, to the disadvantage of the patrons of the railway.

In a few states it is common for local governments to charge an annual license fee on the poles of trolley railways. This practice exists, for example, in several cities of Pennsylvania.

Paving and care of streets.—It is an almost universal practice to require street railway companies to bear the expense of paving or surfacing the space between their tracks in a manner corresponding to the rest of the street or highway. Usually the company must also pave a certain space outside of its tracks, ranging from 9 inches to 2 feet. Where such requirements exist, the railways are generally obliged also to maintain the pavements in repair. In many instances, moreover, the railway company is compelled to clean the street space occupied, to remove snow and ice from it, and sometimes to sprinkle it. All of this work is often done by the local authorities, the expense being collected from the corporations. Provisions regarding the paving and care of the street surface occupied are so common and so nearly uniform that they are not ordinarily mentioned in the detailed presentation in section VII of this chapter.

The most important deviations from the ordinary practice in relation to the paving and care of streets are found in Massachusetts and Philadelphia. The Massachusetts statute of 1898 abolished all former requirements in this respect, and substituted for them an annual tax on gross receipts, payable to the local authorities. In Philadelphia the street railway companies are obliged to pave and maintain, though not to clean, the entire surface of the streets which they occupy. The companies have spent several millions of dollars in paving, and the interest charges on these investments, together with the cost of maintenance of the pavements, represent virtually a larger compensation for franchise privileges than is required in most other American cities.

Occasionally small towns require street railway companies to furnish free street lights, and it is quite common to require free transportation for policemen or other classes of municipal employees.

Percentage of gross receipts.—The most common form of special compensation for franchise privileges, aside from car licenses and paving requirements, is the percentage of gross receipts. Apart from those cases in which the law provides for the sale of franchises to the bidder offering the largest percentage of gross receipts,

there are many others in which street railway companies are obliged by state law, or by local franchise ordinances, to make such payments. Thus in New York city, by state law, all surface railways built after 1884 must pay at least 3 per cent of their gross receipts to the city during the first five years of their franchises, and at least 5 per cent thereafter. The rate of 5 per cent is found also in Richmond, Va., Providence, R. I., Newark, N. J., and one or two other cities. In Cincinnati, Ohio, the company pays 6 per cent of its gross receipts into the city treasury, and in Baltimore, Md., no less than 9 per cent, the rate in this city having been originally 20 per cent. In Buffalo the leading company pays 3 per cent. In St. Louis, Mo., varying percentages are required by different franchises and the total revenue derived by the city is considerable. In most other cities and towns which have adopted this method the percentages actually received in addition to the ordinary taxes are less than 3 per cent, but in some places recent charters or ordinances require larger payments for franchises hereafter granted.

Other forms of payment.—Quite frequently, either as the outcome of competitive bidding or of bargaining with a single corporation, cities have obtained lump payments as compensation for new franchises or additional privileges. In other cases, railway companies have been compelled to pay fixed annual sums prescribed in advance in the franchises.

Occasionally a provision is found for an annual payment based on profits rather than on gross business. Thus, in the state of Massachusetts and in the city of Philadelphia, railway companies are required to pay a certain proportion of the excess of their dividends if the latter exceed a fixed rate. In Des Moines, Iowa, a percentage of net earnings is demanded, and in Topeka, Kans., one-tenth of the excess of net earnings over 10 per cent on the investment. In none of these cases is any important revenue derived by the local governments. The mayor of Des Moines states that the railway claims never to have had any net earnings. In fact, as has been often the experience of states in levying taxes based on net earnings or dividends, this method, which is the most just in principle, is very hard to apply satisfactorily in practice, because of the difficulty of correctly ascertaining the net earnings. Payments based on dividends, particularly if they aim only at the excess of dividends above a certain rate, are unsatisfactory unless the issue of bonds and of stocks be properly regulated.

V.

GENERAL CONSIDERATIONS REGARDING THE REGULATION OF FARES AND COMPENSATION.

The foregoing shows in street railway legislation of recent date a growing feeling manifested that it is essential to the protection of the public interests that local governing authorities should retain some control

over the fares of street railways, or over their financial obligations to the public treasury, which is capable of exercise either continuously or at frequently recurring intervals. It is argued that increase in population, or improvements in methods, may render a fare or compensation which is reasonable to-day unreasonable in the future, and that the conditions may change even within a comparatively short time. It is admitted that companies often find it necessary, through extensions of their lines or otherwise, to increase constantly the quantity and quality of the service which they offer to the passenger; but it is maintained that, even so, it may happen that the profits of the business, under prevailing terms, become excessive.

It would seem, however, that, if the authority to regulate the fares and the payments of street railways is to be thus retained, the practice should be guarded by certain well-defined rules which will protect the interests of the railway companies as well as those of the people. Not only is the street railway company justly entitled to legitimate return on its investment, but in the long run the city will deprive itself of the best service unless it permits such a reasonable return. Such rules need to be applied both where continuous or recurrent regulation is attempted, and where new franchises or extensions of old franchises are granted. As already suggested, provision for competitive bidding in granting franchises can not always be relied upon to secure reasonable terms. The city must be prepared to bargain with the street railway company, and to do this satisfactorily its officers must possess proper knowledge and must properly recognize the rights of both parties.

Publicity of accounts.—It has been repeatedly urged that a fundamental prerequisite to the intelligent and just regulation of street railways, whatever be the procedure by which such regulation is attempted, is an accurate knowledge of the financial conditions of the business, both as to cost and value of property and as to operating expenses. The legislature of Ohio recently enacted a statute of great significance in this connection. It requires uniform methods of accounting and publicity of accounts, both on the part of local governments of all grades and on the part of local public service corporations.¹ The recent charters of San Francisco, Cal., and of Portland, Oreg., likewise demand complete publicity of the financial affairs of corporations holding municipal franchises, and some measure of publicity with regard to such corporations is demanded in a few other less important instances.

Regulation of capitalization.—Closely allied with publicity is the regulation of the issue of capital stock and bonds by public service companies. A considerable proportion of the income derived from the charges of street railways must always go to interest and divi-

dends, and the public has a right to demand that these returns should be based on a reasonable capitalization. While this result can be secured in some measure through publicity in construction and equipment accounts, the actual limitation of stocks and bonds is simpler and more effective. The legislation of Massachusetts on this subject has attracted much attention. In that state, no securities may be issued by a street railway company (or by steam railways), except on the approval of the board of railroad commissioners. Only such amounts may be issued as the board may declare reasonably requisite for the specific purposes set forth in the application of the company, and these purposes must be stated in detail in the resolution of the commissioners authorizing the issue. A further provision declares that, when new stocks are issued by an existing company, they must be offered to the present stockholders, not at their par value, but "at not less than the market value thereof at the time of the increase," as determined by the railroad commissioners, "taking into account previous sales of stock of the corporation and other pertinent conditions."² In other words, the state undertakes to provide that the corporation shall get as much money for its shares as they may be expected to be worth on the market, and to guard against the distribution of stock dividends. When a consolidation of street railways is made, the same painstaking care is used to prevent the issue of securities in excess of the actual value of the property. Similar provisions are found in Massachusetts with regard to other classes of public service corporations. In Rhode Island, also, the issue of stocks and bonds by street railway companies is subject to the control of the railroad commission. In most states and cities, however, no attempt has been made to restrict the capitalization of street railways.

Sliding scale systems.—Sliding scale devices of various sorts are sometimes introduced into street railway laws and franchises for the purpose of securing an automatic adjustment of fares, or more commonly, of compensation for franchises, so that the people shall share in the advantages of an increase in earnings or a reduction in operating expenses. A greater degree of stability is thus assured to the corporations than they would possess if the public authorities reserved the unrestricted right to revise fares or franchise compensation at any time.

A rough form of the sliding scale which is quite often found, requires the fares to be reduced, or the compensation to the local government to be increased, by prescribed amounts, at certain intervals of time. This is based on the assumption that gross earnings and net profits will increase with the lapse of time. The requirement regarding franchise payments in the new San Francisco charter is a prominent illustration.

¹ Laws of Ohio, 1902, page 511.

² Acts of Massachusetts, 1894, chapters 462, 472.

Another form of sliding scale is based on the contingency of an increase in the gross receipts of the railway, either as a whole or per mile of track. Thus, by the franchise of the Columbus Railway Company, fares must be reduced materially when the gross receipts reach \$1,750,000 annually. By state law in Wisconsin, and by some of the franchises in New York city and elsewhere, the percentage payable to the city increases as the gross receipts increase. In other countries more elaborate regulations of this sort are found than in the United States. For example, by the franchise of the Montreal Street Railway Company, granted in 1892 for thirty years, the company is required to pay to the city annually 4 per cent of its gross earnings up to \$1,000,000; 6 per cent on earnings in excess of \$1,000,000 but less than \$1,500,000; 8 per cent on earnings from \$1,500,000 to \$2,000,000; 10 per cent on earnings from \$2,000,000 to \$2,500,000; 12 per cent on earnings from \$2,500,000 to \$3,000,000; and 15 per cent on all earnings over \$3,000,000. Toronto has a very similar arrangement.¹ The arrangement in these cities, by which the higher rate is applied only to the excess above the specified amount of earnings, serves to remove the strong incentive which might otherwise exist to keep down earnings, at least for a time.

The assumption underlying a sliding scale of this sort, that, as the gross receipts of a railway system increase, the rate of profit on capital invested increases correspondingly, is not always a correct one. Even an increase in gross earnings per mile of track may result from a corresponding increase of investment in improving trackage or equipment. It would seem that, if a sliding scale regulation of charges or franchise compensation on the basis of gross earnings is to be attempted, a proper adjustment should be made whenever the railway company extends its lines or otherwise increases its investments materially.

It requires no argument to show that the theoretically ideal basis for the determination of just fares or franchise compensation is the net profits of the business rather than the gross earnings. If the actual profits could be correctly ascertained, a sliding scale based upon them would furnish the simplest and most satisfactory method of adjusting fares and payments to the city. Any other method of automatic adjustment must be largely arbitrary and is bound to work some injustice either to the people or to the corporations.

As far as can be ascertained there is no instance in the United States where a franchise provides for a reduction of street railway fares as profits increase. The most familiar example of such a sliding scale in Europe is found in the franchise of a leading London gas company, which is required to reduce the price charged as the rate of profit increases, with the result

that the people share with the corporation in the gain due to added consumption or reduced operating costs. In a few cases in this country a sliding scale based on net profits or dividends has been adopted to determine the compensation to be paid to local authorities for franchise privileges.

The most conspicuous illustration is the Massachusetts act of 1898, by which any street railway company which has from the beginning of its corporate existence paid in the aggregate dividends equal to 6 per cent on its capital stock, and which is now paying more than 8 per cent, is required to pay a tax, which should more properly be called a franchise payment, equal in amount to the excess of the dividends above that rate. In other words, when the profits exceed 8 per cent the excess must be equally divided with the municipality. In view of the careful restrictions upon capitalization in Massachusetts it is quite possible that this arrangement may ultimately result in considerable revenue to the local governments, though it has so far brought little or nothing. It was urged by the special committee on whose recommendation this law was enacted that the provision for a division of the excess of profits between the corporations and the government was "not subject to the criticism, which appears to be sound, that a limitation of dividends hampers enterprise and improvement. Where a corporation is not limited in the amount of dividend it may earn, but is simply required to pay over a sum equal to the excess of dividends actually paid, over a fixed and reasonable percentage on its capital stock, it will be constantly spurred to render such service that its profits will increase. Being a public service corporation, owned and operated for private profit, it seems just, and in accordance with sound principles, that when the private ownership has received a reasonable return upon its investment, the public should share, through a form of special taxation, in the increment of profit, provided it can do so without the danger of offering an inducement to those in control of the property to stint or conceal their profits."²

Foreign municipalities have often adopted sliding scales based on net profits for determining the compensation to be paid by street railways for franchise privileges. In Berlin the leading company, besides paying 8 per cent of its gross earnings to the city, divides evenly with it whatever net profits exceed 12 per cent on the capital stock which was outstanding at the time the franchise was granted and 6 per cent on shares thereafter issued. A more complicated arrangement is found in Hamburg. The street railway company pays about 10 per cent of its gross receipts to the city in lieu of charges for paving, cleaning streets, and the like. In addition it pays to the city 25 per cent of its profits above 6 per cent on its capital stock, if the dividend rate is between 6 and 7½ per cent; 30 per cent of the excess

¹ Massachusetts Report, pages 134 and 135.

² Massachusetts Report, page 38.

above 6 per cent if the dividend is between $7\frac{1}{4}$ and 8 per cent, and so on until if the dividend exceeds $10\frac{1}{4}$ per cent, the city receives 50 per cent of the profits above 6 per cent. In foreign cities where such provisions exist the capitalization of the corporations is carefully regulated.¹

VI.

MUNICIPAL OWNERSHIP.

Legislation permitting municipalities to own and operate street railways has recently been enacted in a number of states. As yet, however, there is no instance in the United States of municipal operation of a street railway. The leading instances of municipal ownership and private operation are the subways in Boston and New York. It was only, however, after private capital had declined to make the necessary investment that the city of New York undertook the financial responsibility for its present subway. The contract between the city and the Interborough Rapid Transit Company (successor to the Rapid Transit Subway Construction Company) required the latter to build the subway and the tracks therein at a cost to the city of \$35,000,000, aside from certain expenses for terminals and from the payments for damages to private property. The company then received a lease of the property for fifty years, with the privilege of renewal under modified terms for twenty-five years longer. The lessee was required to equip the system with electric apparatus, cars, etc., and to pay interest on the bonds issued by the city, and, subject to certain limitations, 1 per cent on such bonds annually as a sinking fund. It is expected that the city will ultimately own the subway free of debt, and it will probably then be in a position to lease it at much more favorable terms. The lease of the Boston subway is for twenty years only. The disposition of the majority of the people, both in New York and Boston, appears to be in favor of municipal ownership of subways hereafter constructed, with operation by private companies under lease.

The Massachusetts committee on the relations between cities and towns and street railway companies expressed itself strongly in favor of municipal ownership, but it was still more strongly opposed to municipal operation. "The essential point to which the committee desires to call attention is the distinction here drawn between the ownership of the pavement, and consequent full control of the street, and the running of the vehicle." The committee thought it would be desirable to provide in all future franchises for a reversion of the tracks to the public authorities. It also considered it feasible to take over the property of existing companies under the right of eminent domain, if authorized by statute. The assumption of ownership of the tracks by the local government was not

itself, however, to terminate the right of the street railway company to continue operation under lease. The proposal of the committee has never been carried out in actual legislation in Massachusetts.²

The principle that the city should at least own, if not operate, its public utilities was adopted by the special commission which framed the present charter of New York city. That law provides that hereafter every franchise for the use of the streets for railway or other purposes must be limited in duration, and that at its expiration the property in the streets shall revert to the city, which is not permitted to dispose of it, but must either operate or lease it. A similar provision is found in the San Francisco charter. In that city all the existing street railway franchises are limited, so that municipal ownership on a large scale seems likely to become an accomplished fact. The San Francisco charter, indeed, specifically declares that it is the purpose of the city ultimately to own all its public utilities, and provides in detail the procedure by which this may be accomplished. There is, however, no specific provision for taking the property of existing corporations by eminent domain, although the city by threatening the construction of competing plants might bring pressure to bear to compel the sale of the existing properties at a moderate price. At a recent election in San Francisco a majority of the voters favored the acquisition of a certain railway, but the two-thirds vote required to authorize the issue of bonds was not secured.

Many other laws authorize municipal ownership and operation of street railways, either in general, or under certain limited conditions. Thus by statute it is often optional for a local government, at the expiration of a franchise, to take over the property. In some, though not in all, laws of this sort, the municipality may operate a railway so acquired. In a number of states the local authorities are empowered to construct or purchase railways, and also, as a rule, other public utilities, and to operate them. For example, this is true generally, or in the case of certain classes of cities, in Illinois, Indiana, California, Oregon, Minnesota, Colorado, and Washington. In Colorado a recently adopted constitutional amendment gives cities specifically the power of eminent domain over existing "public utilities." In some instances where municipal ownership is authorized, a popular vote is required by the statute to secure permission for actual construction, acquisition, or operation. In Illinois an important additional provision is that the fares under municipal operation must be high enough to pay operating expenses, interest, and sinking fund charges on bonds issued for the purpose of acquisition. Systematic methods of keeping accounts are also required by the law of Illinois, the purpose being to make the people acquainted with the cost of operating the railway, and thus give them the power

¹ Massachusetts Report, pages 162 to 183.

² Massachusetts Report, pages 30 to 32.

to prevent the public utility from becoming a public burden. The people of Chicago, by a large majority, have voted in favor of acquiring the street railways in that city, and active steps toward accomplishing this object are being taken.

Municipal operation of street railways has become very common in Great Britain and in Germany and is rapidly extending in both these countries. (See pages 150 and 153.) It is probably too soon to express judgment regarding the success of the policy abroad, nor would success there be conclusive evidence of the wisdom of municipal operation in the United States. The street railway service in England and Germany is undoubtedly inferior to that in American cities, but there has been an enormous improvement in the past few years, during which time electricity has been rapidly superseding horse and steam traction. It can not at once be concluded that the inferiority of European railways is due wholly or largely to municipal ownership or even to the strict limitations upon private corporations operating street railways. Probably, however, the limitations put upon private corporations have tended to hamper development much more than municipal ownership has. Even where there is no important public regulation, private enterprise in European countries is often far behind that in the United States, especially as regards technical methods. The density of urban population, particularly on the Continent, where large tenement houses are almost universal in cities, makes street railway transportation less important than in American cities. To be sure, the crowding together is itself in some measure due to the lack of satisfactory street railway facilities, but other more important historical causes have contributed to it.

VII.

CONDENSED DIGEST OF STATE LAWS AND LOCAL FRANCHISE REGULATIONS IN LEADING STATES.

California.—Under a recent general state law all local franchises must be sold to the highest bidder, apparently cash payment being intended, though probably the city could provide for annual payments or percentages. The law requires that sealed bids must first be made, but it permits the highest bids to be raised by an additional oral bid, with an advance of not less than 10 per cent, and so on.¹ Special provisions regarding franchises are also found in the individual charters of certain cities, particularly in those charters which have been prepared and adopted locally, as permitted by the California constitution. Thus the San Francisco charter of 1899² requires the sale of any street railway franchise to the bidder offering the highest percentage of

the gross receipts. By this charter also 15 per cent of the voters of the city may, by petition, require the submission of the franchise ordinance to popular vote.³

The general state law limits the duration of charters of all classes of corporations, and that of franchises of street railways, to fifty years. A large majority of the franchises reported to the Bureau of the Census run for fifty years, but several are for twenty-five years and a few for other periods. The San Francisco charter declares that no future street railway franchise shall be granted for more than twenty-five years, and that at the expiration of the franchise the plant must become the property of the city, which may lease but not sell it.

A general law of the state limits street railway fares in cities of the first class (over 100,000 population) to 5 cents.⁴ The new San Francisco charter provides that the local government shall have the power, under franchises hereafter granted, at all times to regulate rates of fare.⁵

The general state law, in addition to the above provision for the sale of franchises, requires that every street railway shall, after five years of operation, pay 2 per cent of its gross receipts to the local government.⁶ Many of the earlier franchises in existence, however, require no special payment. The San Francisco charter provides that the minimum payment to the city on franchises hereafter granted shall be 3 per cent of the gross receipts during the first five years, 4 per cent during the next ten years, and 5 per cent during the last ten years of the grant.⁷ Oakland apparently receives no annual compensation, but the city recently sold a franchise for \$500 in cash. The mayor of Los Angeles reported that the city had received about \$125,000 from street railways during the census year. The state law also requires all street railways to pay car license fees and limits the fee which may be imposed by local authorities to \$50 in San Francisco and \$25 elsewhere.

The San Francisco charter, besides the above-mentioned provision that street railways established under future franchises shall become the property of the city at the expiration of twenty-five years, further declares that it is the purpose and intention of the people of the city that its "public utilities" shall be gradually acquired and ultimately owned. To this end the city supervisors must, from time to time, obtain estimates of the actual cost of different classes of enterprises. The supervisors shall then enter into negotiations for permanent acquisition, by original construction, condemnation, or purchase, of such public utilities as they may think most important, but they must first consider offers for the sale to the city of plants already existing.

Moreover, 15 per cent of the voters of the city, if at

¹ California Statutes and Amendments to Codes, 1901, page 265; 1903, page 90.

² Ibid., 1899, page 242 ff.

³ San Francisco Charter, article 2, chapter 2.

⁴ Civil Code, section 501.

⁵ Statutes of 1901 and 1903, above cited.

any time they desire any given public utility to be owned by the municipality, may, by petition, require the supervisors to submit to a general vote of the people a plan for accomplishing the desired object. The adoption of such a measure requires only a majority vote, unless the plan involves a bond issue, in which case approving votes must be cast by two-thirds of those voting.¹

A vote was recently taken in San Francisco on a proposal to acquire one of the street railway lines, and a majority of the voters were recorded in favor of the proposal; but as the plan involved a bond issue, and less than two-thirds of the votes were cast in favor of it, the proposal was not carried.

Colorado.—The general state law requires the written consent of the owners of more than one-half of the frontage on the street concerned before a street railway can be constructed. An amendment to the state constitution (1902) provides that in Denver, or in any other city adopting the provisions of the amendment, franchises of all sorts shall be granted only by a vote of the taxpaying electors.²

Several of the earlier franchises granted in Denver are unlimited, but other franchises in this city, and all those elsewhere in the state, are limited to periods of from twenty-five to ninety-nine years.

The laws of Colorado contain no provisions regulating fares or special compensation for franchises, and no important provisions on these subjects appear in local franchise ordinances.

The above-mentioned constitutional amendment of 1902 provides that in Denver, or in any city adopting the provisions thereof, the local government may construct or acquire street railways or other public utilities, and may exercise the right of eminent domain for the acquisition of existing properties. The issue of bonds for this purpose requires a majority vote of the taxpaying electors.

Connecticut.—In Connecticut, somewhat exceptionally, all street railways receive from the state legislature not only their corporate charters, but also, by special act in each case, their rights to occupy the streets. Ordinarily the local authorities have no control over the matter, except with regard to the details of adjustment of the tracks to the street grade and other matters of this sort, and even as to these details the railway company may appeal from the decision of the local authorities to the state board of railroad commissioners. The general statute relating to street railways gives the local governments no authority to regulate fares or impose other conditions.³

The legislature has made it a practice, in chartering individual street railway companies, to grant them perpetual rights, but under the state constitution corporate

charters are subject to amendment or repeal by the legislature.

There is in the state law no general provision as to fares and the special acts for individual railways ordinarily contain no unusual restrictions in this respect.

In Bridgeport, New Haven, and Hartford, the only cities in Connecticut from which reports on this point were received, there is no special compensation to the city for street railway franchises, and the general laws of the state contain no provision on this subject.

Georgia.—The legislature of Georgia has provided a general incorporation law for street railways, but the state also grants special charters. Under the general law, the consent of the local authorities is required for the laying of tracks in the street.⁴

The general state law limits the life of street railway charters to thirty years, but the reports of the companies show that the local franchises vary widely in duration. Two franchises, including that of the company in Savannah, are perpetual; two run for twenty years only; while several range from fifty years, or longer periods, up to ninety-nine years.

The general street railway law contains no provision as to fares, and the prevailing rate is 5 cents.

There are no general provisions of law with regard to compensation for franchise privileges. In Atlanta, however, the consolidated railway is required, by the terms of a city ordinance of 1902, to pay to the city 1 per cent of its gross earnings during the first three years, 2 per cent during the next twenty years, and 3 per cent thereafter till the expiration of the various franchises. These percentage payments are in lieu of license taxes, but the company pays the ordinary property taxes. A cash payment of \$50,000 was also made to the city at the time of the consolidation.⁵ Savannah, in addition to the property tax, requires the payment of a fee of \$25 per year on each car and of \$100 on each mile of track. These payments, however, do not indicate any policy of securing special compensation for franchise privileges. They are merely part of a general licensing policy which is applied to all classes of business in most of the Southern states.

Illinois.—The constitution of 1870 prohibits the legislature from granting the right to use the streets of a city to a street railway company without local approval. The general state law before 1899 provided that local authorities could grant franchises to street railways only upon petition of the owners of one-half of the frontage on the streets concerned. By legislation in 1899 this provision was omitted as regards surface railways, though apparently it is still in force as regards elevated railways.⁶

Corporate charters of all classes are limited to ninety-

¹ San Francisco Charter, article 12.

² Mills's Annotated Code, 1891, section 4, page 403; Session Laws of Colorado, 1901, chapter 46.

³ General Statutes of Connecticut, 1902, chapter 217.

⁴ Code of Georgia, section 2, page 180.

⁵ Commercial and Financial Chronicle, Vol. 74, page 377.

⁶ Myers's Authorized Statutes, 1898, chapter 66 and section 321; Laws of Illinois, 1899, page 331.

nine years and may be amended or repealed by the legislature. The state law of 1874 limited franchise grants to twenty years, though some earlier grants were for longer periods and some were even perpetual. In 1897 the limit was extended to fifty years, and it was also provided that cities might grant extensions of existing franchises for the same period of time. No franchises were granted or extended in Chicago under these laws because of opposition from the citizens. In 1899 the act of 1897 was repealed and the twenty-year limit was again imposed.¹

A large majority of the existing franchises in Illinois are limited to twenty years, but a considerable number exist with limits of twenty-five, thirty-five, forty, and fifty years.

The date of the expiration of the more important street railway franchises in Chicago has been a matter of much dispute and litigation. These grants were originally made by the city government in 1858, 1859, and 1861, and were limited to twenty-five years. In 1865 the state legislature passed an act extending the corporate charters of the railway companies holding these franchises so as to make their total duration ninety-nine years. This act sought also to extend the local franchises for a corresponding period of time, but the right of the legislature to do so was later disputed by the city authorities. When the question arose in 1883, at the expiration of the period fixed in the ordinances of 1858, its settlement was postponed by agreement, and the city passed a new ordinance extending all the existing franchises for twenty years. This extension expired July 30, 1903, but the companies claimed rights for important parts of their trackage under the ninety-nine-year act of 1865. This contention was upheld by the Federal circuit court in May, 1904, despite the argument that the act of 1865 related to horse railways only, and appeal from this decision is now pending. Meanwhile, however, various franchises granted after 1865 have expired and the city is moving to oust the companies from the trackage covered. There have been many negotiations between the companies and the city with reference to an extension of the franchises, but no agreement has yet been reached as to terms, and apparently a large majority of the people are determined not to permit such an extension under any conditions, but to insist on municipal ownership, if not also municipal operation.

A general provision of the municipal corporations law of Illinois authorizes cities to license and regulate hackmen, draymen, and "all others pursuing like occupations." This provision has been interpreted by the state supreme court as empowering the cities to regulate fares on street railways, and under it Chicago has fixed the maximum fare within the city limits at 5 cents, requiring that transfers be given to passengers who have

paid cash fares at any connecting point on the lines of any single company.² In Peoria the street railway is required to sell 12 tickets for 50 cents or 100 for \$4, and in Rockford and Springfield 25 tickets must be sold for \$1, but elsewhere in the state there has been little attempt to reduce fares below 5 cents.

Under the general provision mentioned above, authorizing cities to license those engaged in local transportation, Chicago and Peoria both require street railways to pay a license fee of \$50 per car. No other special compensation is at present obtained from the street railways in either of these cities, nor, so far as has been ascertained, in any other Illinois city.

In 1903 the state legislature passed a law which may be adopted by any city on popular vote. If adopted the city may construct street railways and acquire them by purchase, but without the exercise of the power of eminent domain over existing lines. A majority vote of the people is required for the authorization of each acquisition, and before the city can itself operate a railway the approving vote of three-fifths of the electors voting on the question must be secured. The issue of bonds or other obligations also requires a separate popular vote. The charges under public operation must be high enough to provide operating expenses, interest, and sinking fund for bonds issued. The bonds may be issued as a general obligation of the city, or they may be secured by mortgage of the street railway property only.³ No city owning a railway may lease it for a period of five years or longer without having given opportunity for a protesting petition, which, if signed by a specified proportion of the electors, makes necessary the submission of the matter to popular vote.

In April, 1904, the people of Chicago, by a large majority, adopted this law, and by a separate vote of 120,744 to 50,893 favored the acquisition of all the street railway lines in the city. In view of the complications and litigation regarding the expiration of the franchises of the existing lines it will presumably be some time before the acquisition can be accomplished, and it is possible that a compromise may be effected by which private operation, or even private ownership, may be continued.

Indiana.—In cities having boards of public works this body must act in connection with the city council in granting franchises. In incorporated towns 40 per cent of the voters may by petition require any proposed franchise grant to be submitted to popular vote.⁴

The duration of corporate charters of street railway companies under the state law is unlimited, and that of franchises granted by local authorities is not limited by statute; but, with few exceptions, the franchises reported to the Bureau of the Census are limited. The most common period is fifty years, but many have a

¹ See Myers's Authorized Statutes, 1898, chapter 66; Laws of Illinois, 1897, page 282; Laws of 1899, page 331.

² See Part I, Chapter III, page 43.

³ Laws of Illinois, 1903, page 285.

⁴ Laws of Indiana, 1899, page 131.

shorter duration. A recent state law authorized Indianapolis to extend the charter of the street railway company in that city for not more than thirty-four years. At the end of that period the city may purchase the lines at an appraised valuation, or may open the franchise to competition for an extension of not more than thirty years. In the latter case the successful bidder, if it is not the existing company, is required to buy the lines of that company at an appraised valuation.¹

The general street railway law authorizes the companies to fix fares, but this does not preclude the local government from regulating fares by the terms of franchise grants. In various instances local authorities by the terms of franchises have required 6 tickets to be sold for 25 cents. Several years ago a state law² was passed establishing a 3-cent fare in Indianapolis, and this was held constitutional by the supreme court of the state under the general power of the legislature to regulate common carriers.³ But the Federal district court declared that, under the clause of the state constitution forbidding special legislation, the general street railway law, which authorized the corporations to fix fares, could not be amended except by a statute which should apply to all companies.⁴ The later law above mentioned, which authorized an extension of the franchise in Indianapolis, required 6 tickets to be sold for 25 cents, or 25 for \$1.

There is no general state provision on the subject of compensation to cities for franchise privileges. The extended franchise of the Indianapolis Street Railway Company, granted in 1899, required it to pay to the city \$30,000 yearly up to 1925 and \$50,000 yearly thereafter. In Evansville the local franchise requires the company to pay 2 per cent of its gross receipts for the first twelve and one-half years and a gradually increasing percentage thereafter up to 4 per cent for the last twelve and one-half years of the fifty-year grant. The payment to the city during the census year was \$3,485. In Fort Wayne the company is required by its franchise to pay 2 per cent of its gross receipts and \$1 annually on each pole. The receipts are about \$8,000 per year. In Terre Haute the company recently paid \$78,000 for a fourteen-year extension of its franchise.

Several of the classes of cities distinguished by the state laws of Indiana are authorized to purchase, erect, and operate street railways, but no details as to procedure or other matters appear in these statutes, and there is no instance of municipal ownership.⁵

Iowa.—By a general state law of Iowa a popular vote may, on petition of citizens, be required for the granting of a franchise that involves the use of a city's

streets by a public service corporation. Interurban railways have the same power that is granted to steam railway corporations for condemning land, but the use of the public highways requires the consent of the county authorities.⁶

The present statute limits grants of franchises, by cities under special charter, to twenty-five years, but no such limitation appears in the general municipal corporations law.⁷ The majority of the franchises in the state are for twenty-five years, but several are for fifty years, two or three are for other periods of time, and four or five are perpetual.

The state laws are silent on the subject of fares, but the franchises granted in a number of cities and towns require tickets to be sold at a reduced price, usually 6 for 25 cents.

The general laws of Iowa have no provision on the subject of special compensation to cities for franchises. In Des Moines the railway pays 5 per cent of its gross earnings from mail, express, and freight traffic, and is also supposed to pay a certain percentage of its entire net earnings in lieu of other taxes. The company has always denied that it had any net earnings, and has paid the ordinary property tax only. In Sioux City there is a car license fee of \$25. In Davenport and Dubuque no special payments are required from street railways.

Kentucky.—By the Kentucky constitution, which dates from 1891 (section 164), local franchises of all sorts must be sold to the "highest and best bidder."

The present state constitution also limits the duration of local franchises to twenty years. Several railways, however, hold part or all of their lines under earlier grants, some of which are perpetual and others for periods ranging from thirty to ninety-nine years.

The state laws do not regulate fares, but the local franchise ordinances in some of the smaller cities require tickets to be sold at a price somewhat less than 5 cents each.

The mayors of Lexington, Covington, and Frankfort reported that no annual payments as compensation for franchises are received, and the same seems to be true in most, if not all other cities of Kentucky; but in Frankfort a franchise was recently sold, apparently for a cash payment.

Louisiana.—Recent state laws in Louisiana, applying to New Orleans and to all parishes, provide that street railway franchises may be granted only to the bidder offering the highest percentage of the gross receipts. The general state law regarding franchises in parishes further requires a petition of a majority in number and amount of the abutting property holders.⁸ As most cities have special charters, they do not make uniform

¹Laws of Indiana, 1899, chapters 150 and 180.

²Laws of 1897, chapter 132.

³Indianapolis *vs.* Navin, 151 Ind., 139.

⁴Central Trust Company *vs.* Citizens' Street Railway Company, 82 Fed. Rep., 1.

⁵Burns's Annotated Indiana Statutes, 1901, sections 3830, 3963, 4117.

⁶Code of Iowa, sections 779 and 956.

⁷Code, sections 767 and 955.

⁸Laws of Louisiana, 1896, chapter 45, section 87; 1902, chapter 188.

requirements as to franchises; nor is the subject covered by the general municipal corporations law of 1898.

All corporate charters are limited by the constitution to ninety-nine years, and the recent law mentioned above establishes the same maximum limit for local franchises in parishes; nearly all existing franchises in cities, however, are for shorter periods. Most of the franchises of the consolidated street railway system in New Orleans expire between 1950 and 1960.

The state laws contain no general provisions as to fares, and the prevailing rate on all lines is 5 cents.

Few, if any, franchises have ever been granted under the recent laws requiring competition. In New Orleans the street railways make no special franchise payments.

Maine.—Some railways in Maine are incorporated under a general state law, but others have obtained their charters by special act. Under the general law (as well as ordinarily under special acts) the consent of the local authorities is required for the use of the streets, but appeal may be taken by a railway from the action of the local authorities to the supreme judicial court, and the approval of the state railroad commissioners is also necessary.¹

There is no general restriction on the duration of franchise grants. Most of those reported are perpetual, but several are limited to from twenty to fifty years.

The general law is silent as to fares, and no unusual provisions appear in special acts or franchises.

On the subject of special compensation to cities the general state law has no requirement. Augusta and Portland reported that they received no special compensation under the franchises granted by them.

Maryland.—There is no uniform municipal law or street railway law in Maryland. The companies in Baltimore have been incorporated by special statutes, but their right to use the streets has been granted by local authorities. By the new Baltimore charter² the granting of a franchise requires not only favorable action by the city council, but also the approval of the board of estimates, a body composed of 5 officials and having general control of the city finances. This board is directed by the law to inquire diligently as to the money value of the franchise; and while the law provides that future franchises shall be first offered at competitive bidding, the board is supposed to supplement this method, when necessary, by careful bargaining.

The greater proportion of the existing street railway franchises in Baltimore and elsewhere in Maryland are perpetual, but under the constitution the charters of the companies may be amended or repealed by the legislature. The present charter of the city of Baltimore (section 9) limits future franchises to twenty-five years, but the grant may provide in advance for exten-

sions not exceeding in the aggregate twenty-five years, at a fair revaluation. At the expiration of the grant the city may renew it, in accordance with the original procedure for an equal period or the city may take over the plant, either without compensation or at a valuation to be fixed by appraisal (without allowance for value of franchise), as may have been provided in the original ordinance.

The only instance in Maryland in which a city fare of less than 5 cents for adult passengers has been reported is in Cumberland, where 6 tickets must be sold for 25 cents.

Baltimore is quite exceptional in having from the first introduction of street railways insisted upon a large payment to the city for the privilege of using the streets, the city ordinances making the first extensive grants, which date from about 1860, requiring the companies to pay 20 per cent of their gross receipts to the city. Subsequently the payment was reduced by state law to 9 per cent, which is at present required from all the railways in the city. The companies also pay a low car license fee.³ These special payments—the percentage tax and the license fees—amounted in the census year to \$324,398.

The Baltimore charter (section 9) permits the city, at the expiration of the franchise of any public service corporation, to become the owner of the plant and either to operate or lease it.

Massachusetts.—The state of Massachusetts is peculiar and interesting in its policy with regard to public service corporations generally. The present state law regarding street railways,⁴ which was adopted in 1898, after a careful investigation by a special commission, headed by Charles Francis Adams, jr., conforms in general to the earlier policy, but it contains some important modifications. Many street railways obtain their charters by special law, although a general incorporation law has been in existence for some time. By the act of 1898, as was ordinarily true before, the consent of the local governing authorities is required for the use of the streets, and they may impose such restrictions at the time of the grant as they see fit. The law, however, provides that, on appeal by the owners of more than one-half in value of the abutting property, or by ten owners of such property, the action of the local authorities in granting a franchise is subject to revision by the state board of railroad commissioners, and a later law has required that all "locations" of street railways shall be approved by that board.⁵ Where a railway seeks to operate in several towns or cities, part of which have granted a location, appeal may be taken to the railroad commissioners from the refusal of another city or town. In granting to any company the right to extend its railway lines the local

¹ Revised Statutes, 1903, chapter 53; Massachusetts Report, page 96.

² Laws of Maryland, 1898, chapter 123, section 37.

³ See Massachusetts Report, pages 96 and 114.

⁴ Acts of 1898, chapter 578.

⁵ Acts of 1902, chapter 399.

authorities are prohibited from imposing restrictions or obligations not contained in the original franchise.

All state charters in Massachusetts are perpetual, but are subject to repeal or amendment by the legislature. The state law also permits the local authorities to make perpetual franchise grants, and, without exception, the existing franchises reported are perpetual. The state has, however, reserved to the local authorities the right to revoke the "location" at any time; but under the law of 1898 the board of railroad commissioners must approve such revocation if the company opposes it. The franchises for elevated lines in Boston are not, however, subject to revocation.

The general policy in Massachusetts has been to reserve to the public authorities a continuous control over street railway companies, this control being enforceable by the right to revoke the charter or the franchise. Under the law of 1898 the local governments can not directly change any important provision in a street railway franchise, but they may petition the board of railroad commissioners, which, after a due hearing, may regulate fares. Fares shall not, however, without the consent of the company, be reduced below the average rate charged by other companies for similar service under substantially similar conditions. This last provision would seem in considerable measure to destroy the effectiveness of the regulation of fares. It would be impossible to lower the fares of any railway at all, however excessive they might be, if all companies similarly situated happened to charge equally excessive fares. As yet there has been no important instance of the exercise of this power to regulate fares. The fare for ordinary passengers is almost universally 5 cents.

A Massachusetts law which is very important in its bearing upon charges requires that all issues of stocks and bonds by steam and street railway corporations shall be approved by the board of railroad commissioners, and that they shall not exceed in par value the necessary cost of construction, stock dividends and other methods of stock watering being prohibited. This law has been carried out with considerable vigor, and as a result the street railways are much more conservatively capitalized than those of most other states.¹

As far as can be ascertained, the earlier franchises and laws in Massachusetts did not ordinarily require special compensation to the local governments for the use of the streets by railway companies, nor have requirements additional to those imposed by general law been inserted in more recent franchises. Massachusetts has for a long time, however, taxed corporations of all classes more effectively than most states. The general tax on street railway companies is based on the value of the track and franchise in excess of the value of machinery, buildings, and other locally assessed

property. This "corporate excess" value is determined by the state tax commissioner, and is ordinarily based on the market value of the company's securities. The tax rate on the value thus ascertained is equal to the average rate upon other forms of property in the state as a whole. The tax collected, which is in lieu of all taxes upon the shareholders in the street railway companies, is divided among the local governments throughout the state in proportion to the street railway mileage lying within their limits. This arrangement results in giving to cities and towns within which lie the less profitable street railways an amount greater than they would be able to obtain if they collected a tax directly from the local companies.

In addition to this general tax, the law of 1898 provided a form of special franchise taxation which is quite unusual in this country. Any company that shall have paid dividends since the date of its organization averaging 6 per cent yearly on its capital stock, and that now pays more than 8 per cent on such stock, is required to contribute to the state annually a sum equal to the excess of its dividends above that rate; in other words, to divide its excess profits evenly with the public. The same provision appears in the Boston Elevated Railway charter of 1897.² The receipts from the special franchise tax are also to be divided among the localities in proportion to the street railway mileage lying within their limits. As yet no companies in the state pay more than 8 per cent on their capital stock, but several have attained that rate, and the Boston Elevated and several other leading companies already pay 6 per cent. In view of the careful restriction of capitalization, it is probable that as railway profits increase considerable sums may ultimately be received from some of the railways under this provision.

Still another tax in Massachusetts is peculiar in its purpose. In most states the street railways are required to pave the space covered by their tracks and to keep it in repair, sweep it, and remove the snow. In lieu of this requirement Massachusetts has provided a tax on the gross earnings of street railway companies, as recommended by the special commission of 1898. This varies by gradual steps from 1 per cent for railways whose earnings per mile of track are \$4,000 or less to 3 per cent for those whose earnings per mile are \$28,000 or more. On petition of the company or the local government these payments are subject, at three-year intervals, to revision by the railroad commissioners so as to correspond to the actual average cost of caring for the street surface occupied.

The various taxes and other payments made by the street railway companies of Massachusetts to the public authorities in 1902 were equal to nearly 7 per cent of their gross receipts—a larger proportion than in most other states. Probably about one-fifth of the amount

¹ Acts of Massachusetts, 1894, chapter 462.

² Acts of 1897, chapter 500.

paid represents the commutation of the requirement to pave and care for the street surface occupied.

The state laws of Massachusetts do not authorize municipal ownership of street railways. The subway in Boston,¹ however, was constructed and is owned by the city. It is leased to the Boston Elevated Railway Company for twenty years at a rental equal to 4½ per cent on the city's investment. The railway company has sought to secure the right to construct and own other subways, but the city has insisted on retaining its control and has defeated the proposed legislation. It is expected that the city will accordingly construct the other proposed subways and lease them.

Michigan.—In the cities of Michigan a vote of two-thirds of all the aldermen is required to grant a franchise.² In one or two cases in Detroit an unofficial vote of the people has been taken on franchise questions. Such a vote, according to a letter from the mayor's secretary, "was supposed to have a moral effect upon the aldermen." In fact, a recent ordinance of the city requires that future franchises shall be submitted to popular vote, if demanded by 18 members of the city council or by 5 per cent of the voters; but such a vote is purely advisory.

For interurban railways the consent of two-thirds of the owners of property abutting on the roadbed is required,³ but there is no such provision for urban railways.

Corporate charters of street railway companies under the general state law are limited to thirty years, and the charter may be amended or repealed by the legislature.⁴

There is no state restriction on the duration of local franchise grants, but most of the franchises are for the period of thirty years. Several companies, however, report part or all of their franchises as having a shorter duration. In Detroit the policy in recent years has been to grant franchises for track extensions only until the date of expiration of the franchise for the main system.

As to the question of fares the state law merely provides that there shall be no revocation during the term of its franchise of rights once granted a street railway.⁵ About 40 miles of track were constructed by the Detroit Street Railway Company under a franchise granted about 1896 which required that 8 tickets be sold for 25 cents. The older company for a time met the competition of this new railway by a 3-cent fare. Finally a combination of the two companies was effected and the fare on the older lines was raised again to 5 cents (except at rush hours, when tickets sold at the rate of 6 for 25 cents may be used). The city attempted to fix the fares on all lines at 3 cents, but its right to do so

was denied by the courts. In several of the smaller cities of Michigan the local franchise ordinances require tickets to be sold at a reduced rate, usually 6 for 25 cents.

In the absence of any state provision in regard to special compensation to cities, the requirements depend wholly on local franchise ordinances. No special payment for franchise privileges, aside from ordinary taxes, is required in Grand Rapids or Saginaw. In Detroit the lines of the Detroit Street Railway Company were not only not required to pay any special taxes on earnings, but they were not even required to pave and maintain the surface between the tracks. Several of the other franchises in Detroit require the payment of from 1 to 2½ per cent of the gross receipts, the leading lines paying 2 per cent. The total amount received by the city of Detroit from this source in 1902 was \$30,823.

In 1899 a law was passed authorizing Detroit to construct or acquire and to operate street railways, but this act was held invalid by reason of the clause in the constitution prohibiting the state or its subdivisions from taking part in works of internal improvement. A movement is now on foot to secure an amendment to the constitution which shall permit municipal ownership of street railways.⁶

Minnesota.—In the legislation of Minnesota the only provision of importance as to the method of granting franchises is in the new charter of St. Paul, adopted in 1900, which requires a three-fourths vote of each body of the city council.

All corporate charters are limited to fifty years, but with provision for renewal; they may be amended or repealed by the legislature. The general state laws do not limit the duration of local franchises, but the new St. Paul charter restricts the duration of street railway franchises to twenty-five years. Several of the earlier franchises in St. Paul and Minneapolis are perpetual, and most of the others throughout the state are for fifty years.

The general laws of Minnesota contain no provisions as to fares or as to special compensation for franchises. The new charter of St. Paul requires railways hereafter authorized to pay at least 5 per cent of the gross receipts to the city; but nothing is received by the city at present, the existing lines operating under old franchises.

As far back as 1893 the Minnesota legislature enacted a law permitting any city or village at the expiration of five years from the time of granting a franchise to any public service corporation, or at the expiration of any five-year period thereafter, to buy out the plant at an appraised valuation. The approving vote of two-thirds of the electors voting thereon is required to authorize such a purchase.⁷ No action has yet been taken by any city under this law.

¹ For description of this subway, see page 37.

² Compiled Laws of Michigan, section 3111.

³ Public Acts of 1901, chapter 238.

⁴ Compiled Laws, section 6436.

⁵ Ibid., section 6447.

⁶ Proceedings of Detroit Conference of National Municipal League, 1903, page 136.

⁷ Statutes of Minnesota, 1894, section 2592.

Missouri.—The state constitution of Missouri prohibits the legislature from granting the right to use the streets of a city without the consent of the local authorities.¹ A law of 1899 requires, before the granting of a franchise, a petition of the owners of more than half of the frontage on streets which are to be occupied by the street railway;² this provision formerly existed only for certain classes of cities. A general law also permits the local authorities in cities of more than 100,000 inhabitants to require competitive bidding for franchises, but this method has not heretofore been pursued, at least in St. Louis or St. Joseph.³

There is no state provision on the subject of duration of corporate charters or franchises. The actual franchises reported vary greatly in duration, even within the city of St. Louis. The most common period is fifty years, but several franchises are for twenty years only; none are perpetual.

Cities of more than 100,000 inhabitants, designated by Missouri laws as first-class cities, are given the continuous right to regulate fares on railways now built or hereafter to be built.⁴ Other classes of cities are not given this power. In St. Joseph the street railway is required to sell 100 tickets for \$4.

The law for cities of the first class permits them to impose, at the time of granting the franchise, taxes on passengers, cars, or gross receipts. Other classes of cities are granted authority to levy license fees on cars.⁵ Various requirements of percentage payments exist in St. Louis franchises. According to the report of the mayor, the ordinary tax receipts from street railway property were supplemented, in the census year, by \$105,858 from special percentage taxes, and by \$24,750 from car license fees, at \$25 per car.

New Jersey.—The general law of New Jersey provides that no company may be permitted to construct street railways without the consent of the local authorities and of the owners of one-half of the street frontage affected.⁶

The state law contains no restriction on the subject of duration of franchises. Seventeen companies report that all of their franchises are perpetual, and several others report that a part of their franchises are perpetual. Some companies, however, have franchises limited to periods varying from thirty-five to ninety-nine years.

The state laws do not regulate fares, and the prevailing limit fixed by local franchises is 5 cents.

By a state law any city of over 100,000 inhabitants may impose license taxes on street railways for the purpose of regulation, but not for the purpose of taxation or for the purpose of preventing the use of the franchise. This law, however, does not hinder a city from

making such requirements as it sees fit when it first grants the franchise. In Newark the street railway companies are required to pay 5 per cent of their gross receipts and a license fee of \$10 per car. The receipts from street railways, aside from ordinary taxes, were \$86,797 in the census year. In Paterson there is a special payment of 2½ per cent of the gross receipts, which amounted to \$14,636 in the census year.

New York.—A constitutional amendment in New York, passed in 1875, provides that no surface or elevated railway may be constructed in the public streets without the consent of the local authorities and of the owners of one-half, in value, of the abutting property. If such consent be refused, an appeal may be taken to the courts, which are required to investigate through three commissioners the public necessity of the railway.⁷ By statute the consent of the owners of two-thirds, in value, of the abutting property is required for constructing a railway in an unincorporated town.⁸ By other laws, originally enacted in 1884 and applying only to New York city, but since extended to all cities of over 50,000 inhabitants, street railway franchises must be sold, by competitive bidding, to the corporation offering the highest percentage of gross receipts.⁹ By the New York city charter¹⁰ it is further provided that no franchise grant of any sort shall be made except on terms deemed satisfactory by the board of estimate and apportionment, a small body composed mainly of executive officers, which has the chief control over the finances. The board is directed to make careful inquiry as to the value of the proposed privileges, and is supposed thus to supplement competition by careful bargaining. A vote of three-fourths of the members of the board of aldermen is also required. In cities of the second class, with from 50,000 to 250,000 inhabitants, the approval of a similar board of estimate and apportionment must be given subsequent to the auction sale.

Under the street railway law there is no general restriction on the duration of charters or franchises, but charters may be amended or repealed at any time by the legislature. By the New York city charter no franchise for any public utility shall be for a longer period than twenty-five years, but it may contain a provision for renewal, for not to exceed twenty-five years, upon a fair revaluation (section 73). In cities of the second class—from 50,000 to 250,000 inhabitants—franchises are limited to fifty years (section 19). The more important franchises in most of the cities of the state, including New York city, are perpetual, having been granted before the passage of restrictive laws. Seventy companies report that all of their franchises are perpetual, and others report that part of their franchises

¹ Article xii, section 20.

² Laws of Missouri, 1899, page 105.

³ Revised Statutes, 1899, section 5438.

⁴ Ibid., 1899, section 5439.

⁵ Ibid., 1899, sections 5438, 5508, 5857, and 5978.

⁶ General Statutes of New Jersey, 1896, pages 3231 and 3247.

⁷ See Constitution of 1895, article iii, section 18.

⁸ Railroad Law of New York, section 91.

⁹ Railroad Law, section 93; charter of second-class cities, Laws of 1898, chapter 182, section 19.

¹⁰ Laws of 1901, chapter 466, section 74.

are perpetual. There are, however, a considerable number of limited franchises, usually ranging in duration from fifty to ninety-nine years, with a few of nine hundred and ninety-nine years' duration.

A general law, enacted in 1884 and applying to all railways constructed after the passage of the act, limits fares to 5 cents for any distance which can be reached by the cars of a single company within the limits of a single city or village. This is held to require practically unlimited transfer privileges over the lines operated by a single company, including the lines which it holds under lease.¹ The right of the state legislature to revise fares on street railways constructed after 1884 is expressly reserved by the law. Local franchise ordinances in several small towns have required tickets to be sold at reduced rates, usually 6 for 25 cents, but Syracuse is the only large city in which a fare lower than 5 cents is required. The law of 1884, which contained the provision for competitive bidding on franchise grants, also provided that in any city of more than 1,200,000 inhabitants, all surface railways thereafter constructed should pay to the city a minimum of 3 per cent of their gross receipts during the first five years and 5 per cent thereafter. Moreover, the general railroad law provides that other cities and villages may, in granting franchises, require an annual percentage payment, not to exceed 3 per cent of the gross receipts.²

In New York city a few railway franchises dating back of 1884 require small annual payments to the city, but many of the most important lines are free from such requirements. In the franchises granted since 1884 the minimum percentage required by law has seldom been exceeded through competitive bids, though there are a few instances in which the percentage secured in this way is from one-fourth of 1 per cent to 1 per cent above the statutory minimum, and one in which it is 3 per cent above that minimum. The board of estimate and apportionment has of late favored the policy of demanding a percentage increasing from time to time. Thus the franchises for two extensions on Manhattan Island, granted in 1899, required the payment of 4 per cent of the gross receipts during the first five years, 6 per cent during the next five years, 8 per cent during the next five years, and 10 per cent during the remaining ten years of the grant.³ New York city also levies a license fee, usually of \$50, on cars; but some companies are exempt or have lower rates by the terms of their franchises. The total payments by street railway companies to New York city, aside from ordinary taxes, amounted to \$422,177 in 1902.⁴

In Rochester the street railway company pays 1 per cent of its gross receipts to the city, the revenue from this source, together with a small car license fee, being

about \$30,000 a year. In Buffalo the leading company at present pays 3 per cent of the gross receipts. Formerly one of the leading companies was subject to no such requirement, but it combined with another company which under the plan of competitive bidding had agreed to pay 13½ per cent of its receipts to the city. A compromise was made with the city by which 3 per cent should be paid on the receipts of the consolidated system. The total payments to the city from this source in the census year were \$85,851.⁵ In Utica, Binghamton, and Albany no special payment of any importance is made to the city by the street railway companies.

An important state law of 1899⁶ requires that the value of "special franchises," including therewith as a single unit the tangible property so far as it occupies public streets and places, shall be assessed to its full amount by the state board of tax commissioners. The assessment is then reported to the local authorities, and the ordinary tax is collected on this basis. Under this law the assessment of street railway companies, particularly in New York city, has been greatly increased. The constitutionality of the law has been upheld by the New York courts.

The charter of New York city (sections 71 and 73) declares that the rights of the city in its streets and public places are inalienable. Every franchise for a public service enterprise may provide that at its expiration the plant shall become the property of the city, either without payment or at an appraised valuation, which shall not include any allowance for the value of the franchise itself. The city may then either operate the plant directly or lease it for not more than twenty years, after competitive bidding.

The new subway in New York city is owned by the city and leased to an operating company under conditions more fully set forth on page 135.

Ohio.—By a general state law of Ohio franchises for street railways may be granted only with the consent of the owners of more than one-half of the frontage of the streets to be occupied. Moreover, franchises must be sold by public competitive bidding to the corporation offering to make the lowest fares.⁷

The general law (with an exception for a limited class of cities) restricts the duration of local franchises to twenty-five years, without special provision regarding renewal.⁷ Of the 63 companies reporting on this subject, 41 have all of their franchises limited to twenty-five years, and several others hold part of their system under franchises so limited. A few franchises, dating from an earlier time, are perpetual, and a few others are restricted to other periods of time than the present statutory limit.

⁵ Letter from Mayor; see also Massachusetts Report, page 115.

⁶ Laws of 1899, chapter 712.

⁷ Revised Statutes of Ohio, sections 2501 and 2502; repeated in New General Municipal Code, Laws of Ohio, special session, 1902, pages 31 and 32.

¹ Railroad Law, section 101; see also page 42.

² Ibid., section 95, as amended.

³ Myers, in Municipal Affairs, March, 1900, pages 155 and 157.

⁴ Annual Report of Comptroller of New York, 1902.

In 1896 a special act was passed which permitted existing companies in any city to consolidate, and which authorized the city governments in such cases to extend the franchises for fifty years. The terms with regard to fares which should be imposed by the city at the time of such extension were to remain unchanged for twenty years. At the end of the twenty-year period, and again fifteen years later, the city was to have the right to alter the rates of fare. The railway companies of Cincinnati, in whose interest principally the law was passed, consolidated and received an extension of their franchises for fifty years. The act was repealed in 1898, and it has recently been declared unconstitutional by the superior court of Cincinnati. The case is still pending, however, before the state supreme court.¹ The franchise of the Peoples Railway Company of Cleveland, granted in 1902, but held invalid by the courts, authorized the city to take possession of the railway at any time on payment of 10 per cent more than the actual structural value.

The provision that franchises shall be granted in every case to the corporation offering the lowest fares, together with the general feeling of the people in Ohio on this subject, has resulted in the introduction of important limitations in the matter of fares in a number of recent franchise grants. In Columbus the franchise of the Columbus Railway Company, which, in 1901, was extended for twenty-five years, requires that 7 tickets shall be sold for 25 cents, until such time as the gross receipts of the company may reach \$1,750,000, when 8 tickets must be sold for 25 cents. The new Central Market Street Railway in the same city is required to sell 7 tickets for 25 cents, and also to pay 2 per cent of its gross receipts to the city. In both cases universal transfers on both cash fares and tickets are required for the lines of the single company, while for a 5-cent fare the passenger must be given a transfer to the lines of the other company.² In many of the smaller cities of the state local franchise ordinances have required the companies to sell 6, and in a few cases 7, tickets for 25 cents.

The subject of street railway fares has been a matter of much agitation in Cleveland during recent years. In 1902 a franchise was granted to the Peoples Railway Company to construct certain lines on which a 3-cent fare was to be charged. This franchise covered part of a much more extended system which had been planned by the city, and which was to be restricted to the same fare throughout. This franchise was, however, held invalid by the courts because of technical errors. In September, 1903, another franchise was granted to the Peoples Railway Company, also subject to the requirement of a 3-cent fare, but construction has not yet

begun. The city authorities of Cleveland had previously sought to compel the two existing companies to reduce their fare to 3 cents, but in 1904, after protracted litigation, the United States Supreme Court held that the city could not modify the terms of the original grants. Pending the final decision of the court, the two companies consolidated and voluntarily began to sell 6 tickets for 25 cents and to give universal transfers. In 1904, however, the consolidated company raised the price of tickets to 11 for 50 cents, and restricted the transfer privilege somewhat. Various proposals for a zone system of charges have been made, but no agreement could be reached between the city and the company. The subject of fares is therefore still an unsettled one in Cleveland. In Cincinnati the extension franchise of 1896, now under litigation, permitted a 5-cent fare for the first twenty years.

The general law in Ohio authorizes municipalities to levy car license fees, and a recent enactment permits them to agree with any street railway company now paying such fees to substitute therefor a percentage of gross receipts.³ In Cleveland a car license fee of \$10 is imposed, but there is no other requirement of compensation at present. As indicated by the franchise in Columbus, above mentioned, it is feasible under the state law to require a percentage of gross receipts at the time of granting the franchise, notwithstanding the fact that the form of competition provided by law has to do with rates of fare. In Cincinnati the new franchise of 1896 required the railway company to pay 6 per cent of its gross receipts to the city, and the revenue derived from this source is about \$200,000 a year. No special payment aside from ordinary taxes is received from the street railway companies in Springfield, Canton, Toledo, or other cities from which reports were received.

Oregon.—There is no general law in Oregon regarding the method of granting local franchises. The new charter of Portland, prepared by a local board and adopted by popular vote in 1902, provides that any ordinance granting a franchise or leasing public property for a period of five years or more must, on petition of 15 per cent of the voters, be submitted to popular vote.⁴

The state laws do not place any general restriction on the duration of franchises. All of the franchises reported to the Bureau of the Census are limited, the most common period being thirty years. The new Portland charter (sections 95 and 96) restricts all future franchise grants to twenty-five years. At the expiration of this time the city may elect to take over the property at an appraised valuation, which shall not include the value of the franchise itself, or it may renew the grant to the same corporation or transfer it to any other company

¹ See street railway section of Commercial and Financial Chronicle, November 14, 1903, page 1918.

² Annual Report of City Clerk of Columbus, 1901, pages 22, 23, 43, and 44.

³ Laws of Ohio, 1902, page 502.

⁴ Charter of Portland, section 108.

offering better terms. If the grant is to a new company the grantee must purchase the plant at an appraised valuation.

No general provisions regarding fares appear in the state laws of Oregon. The two companies in Portland are allowed, by their franchise ordinances, to charge 5 cents.

Neither the general laws nor the new charter of Portland contain provisions regarding special compensation for street railway or other franchises. The Portland charter, however, declares that the value of franchises is to be assessed for the general property tax, and it requires all franchise holders to make detailed reports of their business to the city authorities. Shortly before the adoption of the new charter in Portland the city council extended the franchises of the two principal street railway companies for a period of thirty years. In addition to the various requirements regarding the paving of streets and the construction and maintenance of bridges, the city provided that the Portland Railway Company should pay \$1,000 yearly for the first five years, and that the rate of compensation should increase gradually until it becomes \$5,000 yearly for the last five years of the grant. In the case of the City and Suburban Railway Company the rate of compensation was fixed at \$3,000 yearly for the first five years, and the rate is to increase up to \$12,000 yearly for the last five years.

The new Portland charter, as above indicated, permits the city to take over a street railway or other public utility at the expiration of its franchise. To do so, however, requires the approval of a popular vote. The question whether the city shall acquire the plant must be submitted to vote, if demanded by petition of 15 per cent of the electors. If the city takes over the property it may either operate it directly or lease it for not more than twenty-five years, or it may at any later time sell the property and franchise to the highest bidder (sections 95 and 96).

Pennsylvania.—The state law contains no provisions regarding the method of granting franchises beyond a requirement that the consent of the local authorities shall be obtained before a street railway is constructed in the public streets or highways. The usual practice of city councils, as reported by the mayors of leading cities, is merely to pass an ordinance on the subject in the same manner as they pass other ordinances.

The state law imposes no restriction as to the duration of charters or franchises, but the constitution gives the legislature the right to amend or repeal the charters of all corporations. Of the 98 companies reporting, 75 have perpetual franchises for all their lines and several others have perpetual franchises for part of their lines. Of the other companies reporting, 9 have franchises for nine hundred and ninety-nine years and only 3 report limits as short as fifty years. All franchises in Philadelphia are perpetual, even those most recently granted.

The state laws do not regulate fares. In most local franchises the restrictions on fares present no peculiar features, although in a considerable number of the smaller cities and towns the local franchise grants have required tickets to be sold, usually at the rate of 6 for 25 cents. The recent franchises for elevated, subway, and surface lines in Philadelphia, which in respect to fares closely resemble those for the many earlier lines, merely provide that the fare for a continuous ride shall not exceed 5 cents within the city limits, no provisions regarding transfers being inserted.¹

As to special compensation the state law merely provides that cities of the second and third classes may levy license fees on street cars, and that companies in Philadelphia must pay a license fee of \$50 per car, which may not be increased by the city authorities in case of companies already chartered at the time the statute was passed.² The state itself levies somewhat heavy taxes on the stocks and bonds of street railways and on their gross receipts. In Philadelphia, by virtue of the terms of the various franchise grants rather than by general law, most, if not all, street railway companies are required to pay a tax of 5 per cent upon all dividends in excess of 6 per cent. This provision, for example, is found in the important new franchises granted in 1901. As there is no restriction upon capitalization, this requirement is easily obviated by stock dividends, etc., and hence does not result in much revenue. The car license fees are, however, a somewhat important source of income to the city, amounting to about \$100,000 in the census year.

When, about 1892, the street railway companies of Philadelphia desired to change from animal power to electric traction, the city seized the opportunity to require them to pave the entire street surface in the streets occupied and to maintain the pavement in the future. The same provisions were inserted in the new franchises of surface lines granted in 1901. This requirement constitutes virtually a greater compensation to the city than the percentages on gross receipts required in most cities where the street railway company paves only the space between its tracks. The Philadelphia railways have expended several millions of dollars in paving streets, and their annual expenses for maintenance are quite large. The total payments of the Union Traction Company, of Philadelphia, to the state and local authorities, including the expense of maintaining the pavements, have averaged about 7 per cent of its gross receipts during the past three fiscal years. The direct payments for new paving have been made largely out of capital, and the interest on such expenditure is not included in computing this 7 per cent.³

Car licenses or pole licenses of moderate amount

¹In regard to transfers on existing lines in Philadelphia, see page 42.

²Public Laws of Pennsylvania, 1868, chapter 849; 1901, chapter 20, article 19, section 3; 1901, chapter 224.

³See Massachusetts Report, pages 128 and 129.

are required in a few other cities of Pennsylvania, but aside from these there is little or no payment to the local authorities in addition to the ordinary taxes. Thus there are no special payments, aside from such licenses, in Allentown, Easton, Erie, Pittsburg, Reading, and Scranton. In Harrisburg the street railway company is required to pay 3 per cent of its gross receipts, the revenue to the city from this source being about \$2,900 yearly.

Rhode Island.—By the state constitution of Rhode Island street railway charters can be granted only by special acts of the state legislature. In some cases the legislature has also granted the right to use streets, without action of the local authorities; but in other instances—as, for example, in the charter of the Rhode Island Suburban Railway Company—the consent of the local governments has been required, and local self-governing bodies have been permitted to impose reasonable rules and regulations.²

The general state laws are entirely silent as to the duration of franchises. According to the reports of the companies, 6 of the 8 have perpetual franchises. The Union Railroad Company, which includes a large proportion of the total trackage in the state, was in 1892 granted by the state legislature a twenty-year extension of its franchises, with exclusive authority to operate in Providence. The franchise of the railway company in Woonsocket has been limited by the city council to twenty years.

The Rhode Island legislature in 1898 passed a very peculiar statute. It applies only to those street railway companies which may indicate their written consent thereto, but in case of consent it becomes binding as between the state and such assenting company, and its terms are not subject to amendment or repeal without the consent of the company. The law imposes a tax for state purposes of 1 per cent upon the gross earnings of assenting companies whose dividends do not exceed 8 per cent on the par value of their capital stock. If the dividends exceed 8 per cent an additional amount equal to such excess also goes to the state as a tax. The issue of capital stock requires the approval of the state railroad commissioner. Companies accepting this act are to have their existing franchises and rights guaranteed in perpetuity regardless of the limits prescribed in their present charters or franchises. Cities and towns are specifically denied the authority to require the removal of the tracks of these assenting companies except for police reasons, and in such cases a substitute location must be provided. The companies assenting, however, are bound to continue to make any payment which they are now making to the local governments, even after the expiration of the existing franchise, unless a new agreement shall be made increasing the obligations of

the railway. This last provision seems quite valueless, since no additional requirement could apparently be exacted by the local authorities except as a condition for the granting of additional privileges.³

The law of Rhode Island regarding the issue of transfers is summarized on page 43. There is no general law regarding fares, and the special laws and franchises contain no unusual provisions on this subject.

The state law regarding the Union Railroad Company requires it at present to pay 5 per cent of its gross receipts—only the receipts within the city itself—to Providence.⁴ This payment in the census year amounted to \$66,195. In Woonsocket the local franchise requires the payment of 3 per cent of the gross receipts, and the city received \$1,631 from this source in the census year.⁴

Virginia.—The new constitution of Virginia (1902, section 125), and a statute since passed in accordance therewith, require all future grants of municipal franchises to be made by competitive bidding. The franchise must be awarded to the highest responsible bidder, unless, in the opinion of the majority of the members elected to the city council, the public interests will be better served by awarding it to some other bidder, in which case the reason for doing so must be stated in the body of the ordinance. The city may reject all bids.⁵

By the new constitution and statute⁶ the duration of future franchises, as well as of leases of public property, is restricted to thirty years. The law requires that every franchise shall provide in advance that at the expiration of the thirty-year period the plant shall become the property of the city, either without compensation or on payment of the appraised valuation exclusive of any allowance for the franchise. A considerable number of earlier street railway franchises in Virginia are perpetual, but the greater number are limited to periods ranging from thirty to fifty-six years.

There is no state law on the subject of fares. In Richmond, Norfolk, Danville, and most of the other cities, however, the local franchises require the street railways to sell 6 tickets for 25 cents. The new constitution of the state declares that “the right of the commonwealth, through such instrumentalities as it may select, to fix and regulate the charges of public service corporations shall never be surrendered or abridged” (section 164).

Aside from the requirement of competitive bidding on franchise grants, the state law makes no provision for special compensation to cities. As in other Southern states, however, the local governments are authorized to levy license taxes. In Richmond there are no car licenses, but the franchise of the leading railway system requires 5 per cent of the gross receipts to be

¹ Article IX of Amendments, section 1.

² Acts and Resolves of Rhode Island, May, 1899, page 30.

³ Public Laws of Rhode Island, 1898, chapter 580.

⁴ Massachusetts Report, page 130.

⁵ Acts of Assembly, extra session, 1902-3, pages 426, 427.

⁶ Ibid., page 425.

paid to the city.¹ The revenue from this source in the census year was \$28,121. In Norfolk the franchise of the leading company, dating from 1888, restricted the license taxes on cars for ten years to certain rates, but left the license system thereafter to the discretion of the city. The city now levies on all companies a license tax of 4 per cent of their gross earnings, the revenue from this source in the census year amounting to \$12,671.

Washington.—The state law of Washington merely provides that at least 5 members of a city council must vote for a local franchise. The low-fixed number is perhaps explained by the fact that several of the city councils have only 7 members. The practice in Seattle, apparently adopted on the initiative of the city merely, is to sell street railway franchises by competitive bidding to the person or corporation offering to pay the city the highest percentage of the gross receipts.

The state law limits the charters of corporations to fifty years, and they may be amended or repealed by the legislature. There is no general restriction on the duration of local franchise grants. One perpetual franchise is reported, but most of the franchises are limited to from twenty-five to fifty years.

The general laws of Washington do not regulate fares, but by local franchises they are ordinarily limited to 5 cents.

In Seattle, by the local ordinances, street railways are required to pay 2 per cent of their gross receipts to the city, this minimum being fixed when the franchise is opened to competition. The revenue from this source is approximately \$20,000 yearly. Spokane and Olympia require no special payment of any importance.

By an act of 1899 municipalities are authorized to construct, purchase, or obtain by condemnation street railways or other public service enterprises, but no detailed provision is made as to the method of acquiring such public ownership.²

West Virginia.—There is no general law in West Virginia regarding street railway franchises. Each city is governed by a separate charter. The new charter of Parkersburg requires future franchise grants to be submitted to referendum vote, if demanded by one-fifth of the qualified voters. It further provides that franchises shall be sold to the person or corporation offering the highest compensation to the city, or the lowest fares.³

Corporate charters of all classes are limited to fifty

years, but there is no general law restricting the duration of local franchises.

The new charter of Parkersburg limits all franchises to thirty years. It further declares that no grant for an extension of a street railway hereafter constructed shall be made for a period exceeding the duration of the original franchise. At the expiration of the franchise, the grantee may be required to sell the property to the city at its appraised valuation independent of its earning capacity. Several of the franchises reported from West Virginia are perpetual, while others are limited to from twenty to fifty years.

The Parkersburg charter provides that no future franchise shall be granted without an annual payment to the city, but it contains no further details as to amount or basis of payment. The franchise recently given by Wheeling for a period of fifty years to the City Railway Company requires the payment of \$300 per mile of line for the first twenty years, and \$1,000 per mile for the last thirty years of the grant. This franchise also provides that the street railway shall be operated exclusively by union labor.

Wisconsin.—The general state laws of Wisconsin do not contain any provisions regarding the manner of granting franchises.

Though the state law contains no restriction on the duration of local franchises, most of those reported are for shorter periods than fifty years, several are for exactly fifty years, and only one is perpetual.

The state law contains no provision regarding fares. In Milwaukee the companies are required by the terms of their franchises to sell 6 tickets for 25 cents or 25 tickets for \$1, and similar provisions are found in the franchises granted by several other cities.

The general state law regarding street railway companies provides that the local authorities may prescribe the payment of license fees. Neither Milwaukee nor La Crosse, however, requires such payment. The law further provides that in lieu of taxes on property, street railway companies shall pay to the local authorities 2 per cent of their gross receipts if the receipts are less than \$500,000 per year, and 4 per cent if they are more than \$500,000.⁴ This constitutes a lighter tax than street railway companies in many other states pay on their property. In La Crosse the company is required by the local franchise to pay 3 per cent of its gross receipts even though they are less than \$500,000, but in Milwaukee nothing is paid beyond the 4 per cent provided in the state law.

¹ See Massachusetts Report, page 132.

² Laws of Washington, 1899, chapter 128.

³ Acts of West Virginia, 1903, chapter 66, section 84.

⁴ Laws of Wisconsin, 1899, chapter 354, amending earlier statutes which imposed taxes at other rates.

CHAPTER X.

STREET RAILWAYS IN EUROPEAN COUNTRIES.

I.

UNITED KINGDOM.¹

Comparison with the United States.—The statistics of street railways, or tramways, as they are called in Great Britain, which are published annually, cover practically only urban lines. In addition to these, there are a few interurban electric railways, built under what is known as the light-railways act, the returns for which are included with those of steam railways.

Table 81 shows for the years 1902, 1901, and 1898 the leading statistics of the tramways of the United Kingdom. The figures include only the surface railways.

TABLE 81.—*Trackage, traffic, and financial statistics of tramways in the United Kingdom: 1902, 1901, and 1898.*

[House of Commons Papers, "Returns of Street and Road Tramways," 1902, page 2.]

	1902	1901	1898
Length of line (first main track), miles.....	11,484	1,305	1,064
Capital invested.....	\$153,597,772	\$130,417,445	\$80,262,547
Number of passengers.....	1,394,452,983	1,198,226,758	858,485,542
Passengers per mile of line.....	989,658	918,181	806,847
Gross earnings.....	\$32,504,770	\$29,009,508	\$22,191,853
Operating expenses and taxes.....	\$23,446,179	\$22,021,784	\$17,971,171
Ratio of operating expenses and taxes to gross earnings, percentage.....	72.1	75.9	76.9
Number of cars.....	7,752	7,184	5,335
Number of horses.....	24,130	34,422	38,777
Number of steam locomotives.....	388	527	589
Passenger receipts.....	\$31,465,889		
Average fare per passenger.....	\$0.0236		
Car mileage.....	145,127,425		
Passengers per car mile.....	9.61		
Gross earnings per car mile.....	\$0.224		
Operating expenses per car mile.....	\$0.162		

¹ Additional trackage of double tracked railways, exclusive of sidings and switches, 852.7 miles.

² Includes expenditure for construction on lines not yet in operation.

³ Passengers per mile of track, exclusive of sidings and switches, 586.762.

The table indicates that the development is much less marked in the United Kingdom than in the United States. The total length of track in the United Kingdom in 1902 was 2,336.7 miles, exclusive of sidings and switches, or presumably about 2,400 miles if these be included. This is approximately one-ninth of the mileage in the United States. The number of fare passengers carried by the British tramways during 1902 was 1,394,452,983, as compared with more than 4,774,211,904 in the United States. To the British statistics, however, should properly be added the number of passen-

¹ House of Commons Papers, "Returns of Street and Road Tramways," 1902.

gers carried on the four underground railways in London and on the elevated railway in Liverpool. These aggregated 192,377,288 in 1902, making a grand total of 1,586,830,271, or one-third of the number in the United States. The passengers carried by the omnibuses in London, where surface railways are not permitted in the central portion of the city, number nearly 300,000,000 per year.

In judging of the relative importance of street railway traffic in the two countries the number of urban inhabitants must be taken into account. The total population of the United Kingdom in 1901 was 41,607,552, and the average number of rides on the tramways, underground, and elevated railways was 38 per capita, as compared with 63 in the United States. But the population living in urban communities of more than 3,000 inhabitants in England and Wales and in urban communities of more than 2,000 inhabitants in Scotland and Ireland numbered 29,144,726, the proportion of urban to total population being much greater than in the United States. The number of street railway rides per urban inhabitant is thus 54, as compared with 168 rides per inhabitant of urban communities of more than 4,000 population in the United States. It may be roughly estimated from the statistics of population in incorporated places of from 2,500 to 4,000 inhabitants, that if urban communities of 3,000 to 4,000 were included in the computation of the American ratio it would be reduced to about 160 rides per inhabitant. Such a comparison is necessarily imperfect in many respects, but it gives some idea of the relative development of street railways in the two countries.

The street railway business in the United Kingdom, however, has grown with enormous rapidity during recent years. In 1890 the number of passengers carried on the tramways proper was 526,369,328, the traffic in 1902 thus being more than two and one-half times as great as in 1890. During the four years from 1898 to 1902 the length of line (first main track) of the tramways in the United Kingdom increased about 40 per cent, and the number of passengers on the tramways increased more than 60 per cent. This development has been coincident with a rapid substitution of electric for animal and steam traction, the extent of change being indicated only in part by the figures of the table showing the decrease in the number of horses and of

steam locomotives. In 1902, 871 of the 1,484 miles of line were operated exclusively by electricity; 384 miles by animal power; 156 miles by steam; 25 miles by cable; 10 miles by gas motors; and 38 miles by more than one kind of power.

The wide difference between the conditions of street railway operation in Great Britain and in the United States is sharply indicated by the comparison of the car mileage with the number of passengers. The average number of passengers per car mile on the British tramways in 1902 was 9.61, while the corresponding ratio in the United States was only 4.26. This difference probably is not due to greater crowding of cars in the British cities, nor probably is it due in any considerable measure to the use of larger cars, although many of the British cars are double decked. The chief reason for the difference in the number of passengers per car mile is the fact that the distances traveled by passengers in the United Kingdom average much less than in the United States.

Because of this difference in the length of journeys it is scarcely proper to compare street railway fares in the two countries. The receipts from passengers in the United Kingdom in 1902 represent an average fare of 2.26 cents. In practically all English cities street railway fares are graded according to the distance traveled. It is unjust to compare either the minimum or the maximum fare in such a case with the uniform fare, regardless of distance, prevailing in American cities. Probably the lowest scale of fares in Great Britain is found in Glasgow. In that city the lowest rate of fare is 1 cent ($\frac{1}{2}$ penny), the average length of the permissible trips at that charge being reported as 0.58 mile. For 2 cents one may ride an average of 2.29 miles; for 4 cents, an average distance of 4.6 miles; for 6 cents, an average of 6.84 miles. The maximum fare is 7 cents. The average fare for all rides in Glasgow in 1902 was about 1.8 cents.¹

The average gross receipts per car mile for the British tramways, 22.4 cents, are almost exactly the same as the receipts per car mile in the United States. This fact, in conjunction with the fact that the average fare per passenger is so much lower in the United Kingdom than in this country, is another indication of the relative shortness of the rides in the United Kingdom.

The ratio of operating expenses to operating receipts for the tramways of the United Kingdom in 1902 was 72.1 per cent. The British statistics include taxes with operating expenses. If taxes be so included in the statistics for the United States, the ratio of operating expenses to operating earnings becomes 62.8 per cent.

Municipal ownership.—All of the street railways in Great Britain, up to a few years ago, were operated by

private corporations, most of which had been organized under an act of 1870, which limited the duration of franchises for the use of the streets to twenty-one years. This act permitted the cities at the expiration of the grants to take over the railways on payment of their appraised value, exclusive of any allowance for the franchise. The shortness of the franchise term doubtless served to hamper the development of the business, as very few of the companies with limited franchises were willing to introduce electric traction, although electricity had already proved its advantages in the United States. Some of the municipalities, however, granted extensions of franchises on condition of installing electric traction. Many of these early franchises have expired during recent years, and in most cases the cities have acquired the plants and have adopted the policy of direct municipal operation. The cities doing so, in most instances, undertook at once a thorough renovation of the system and the introduction of electric power.

In 1902, of the tramway systems in the United Kingdom 118 with 885.5 miles of track were owned by the local authorities, as compared with 115 tramways having 598.5 miles of track owned by private corporations. A few of the publicly owned railways are now operated by private companies under lease, but much the greater number of them are operated by the local authorities directly. The London county council operates part of the lines which it owns and leases others, while there is a considerable amount of trackage in London that is owned by private corporations. The leading system in Manchester is owned and operated by a private corporation, but the city operates the other line. In Birmingham the city owns most of the track, but leases it to a company. Nearly all of the remaining cities of more than 200,000 inhabitants in England and Scotland operate their own railways. There are about 15 private companies, including those which hold municipal plants under lease, whose annual earnings exceed £25,000 each, while about 25 municipal plants report earnings exceeding that sum.

It is scarcely feasible to pronounce a final judgment as to the success of municipal ownership in Great Britain. Because of the restrictions placed upon private corporations which prevent them from adopting improved methods, a comparison of the results of public and private operation in any general way is misleading.

Individual cities.—Table 82 presents the traffic and financial statistics of tramways in the leading cities of the United Kingdom for 1902. The population of the cities is indicated, but in some instances the railways serve also suburban towns, so that the comparison between the population and the trackage and traffic is not altogether exact.

¹ See paper of Robert Donald, *Street Railway Journal*, January 3, 1903.

TABLE 82.—TRAFFIC AND FINANCIAL STATISTICS OF TRAMWAYS IN LEADING CITIES OF THE UNITED KINGDOM: 1902.

[Compiled from Returns of Street and Road Tramways, House of Commons Papers, 1902.]

CITIES.	By whom operated.	Population, 1901.	Length of line, miles.	Power used.	Number of passengers carried.	Number of rides per inhabitant.	Car mileage.	Passengers per car mile.	EARNINGS.		Operating expenses and taxes.	Ratio of expenses to earnings (percentage).
									Gross.	Passenger.		
Birmingham ¹	Company mainly under lease.	522,182	27.2	Electric and animal.	47,536,078	91	4,746,202	10.0	\$1,218,997	\$1,202,167	\$939,458	75.2
Bradford	City	279,809	39.6	Electric	23,054,400	82	2,141,176	10.8	475,652	467,476	272,612	57.3
Bristol	Company	328,842	28.2	Animal	36,714,906	112	5,462,039	6.7	1,041,270	861,117	698,752	67.1
Leeds	City	428,953	37.9	Electric and animal	48,167,781	112	4,726,043	10.2	1,091,527	1,074,372	696,639	63.8
Leicester	City	211,574	12.1	Animal	10,465,733	49	911,414	11.5	224,769	219,061	190,582	84.8
Liverpool ²	City	684,947	66.9	Electric	106,024,728	155	11,604,533	9.1	2,418,641	2,386,089	1,620,520	67.0
Manchester	Company	543,909	27.6	Animal	46,674,600	82	483,250	6.2	1,980,443	1,892,850	1,385,867	71.8
Manchester	City	214,403	55.7	Electric	23,590,288	128	1,831,126	12.9	452,346	445,864	307,908	68.1
Newcastle	City	18,9	16.9	Animal	12,544,331	58	1,155,837	10.9	275,984	275,984	170,060	61.6
Nottingham	City	239,753	13.4	Animal and electric	16,167,385	67	1,400,923	11.5	383,436	377,767	200,422	52.3
Salford	City	230,956	20.9	Animal	23,099,643	105	2,481,084	9.3	444,311	431,362	432,369	97.3
Sheffield	City	380,717	27.8	Electric and animal	49,176,631	129	3,791,993	13.0	924,966	923,623	600,779	65.0
Glasgow	City	735,906	53.5	Electric	163,678,190	222	12,615,021	13.0	2,990,041	2,982,318	1,426,600	47.7
Edinburgh	Company under lease.	316,479	23.6	Electric and animal	35,150,474	134	3,590,913	9.8	807,289	788,144	548,498	67.9
Edinburgh	Company		5.0	Animal	7,127,383	159	439,929	16.2	70,297	68,944	67,240	95.7
Dublin	Company	290,638	47.5	Electric	46,307,402	159	6,748,638	6.9	1,206,751	1,151,832	665,216	55.1
Belfast	Company	349,180	33.2	Animal	27,174,714	78	2,962,910	9.2	648,573	630,187	552,679	85.2
London ⁴	County council	6,581,375	24.4	Animal	119,880,559	18	10,371,866	11.6	2,248,970	2,137,985	1,993,430	88.6
London ⁴	Company under lease.		64.5	Animal	160,209,597	47	16,662,465	9.6	3,782,312	3,674,407	3,737,078	98.8
Three companies			23.5	Animal	31,649,199		3,092,809	10.2	617,539	599,139	578,500	93.7

¹ Exclusive of two or three suburban lines.² Exclusive of elevated railway, which carried 10,466,726 passengers in 1902.³ Includes some omnibus traffic.⁴ Exclusive of omnibus lines and of 4 underground railways, the latter carrying 181,910,562 passengers in 1902.⁵ Includes rental paid to county council: total item of rental, including offices and buildings owned by private persons, \$472,352.

This table emphasizes the wide difference between the amount of trackage in British cities and in cities of corresponding population in the United States. A rough estimate of the track mileage may be obtained by adding from 60 to 75 per cent to the figures showing length of line. The greatest proportion of trackage to population is found in Dublin, where some suburban lines are included, and in Manchester, Liverpool, Bradford, and Glasgow. The greater number of the large cities in the United Kingdom (aside from London) have between 0.05 and 0.15 miles of line per thousand inhabitants, while, for the leading American cities, the corresponding figures range from about 0.20 to 0.60.

The number of passengers carried is also decidedly less in proportion to the population served in the United Kingdom than in this country. For most of the cities covered by the table the range is between 75 and 160 rides per capita yearly, as compared with from 200 to 265 in American cities of similar size. The traffic is most highly developed in Glasgow, where the average number of rides per inhabitant is 222 yearly.

In comparing the various tramway enterprises from the standpoint of the ratio of operating expenses to operating earnings, it should be noted that the sums paid by certain private corporations as rental for tracks leased from the municipalities are included with other operating expenses. Thus the North Metropolitan Tramway Company pays for the lines which it leases from the London county council a rental so great, that the net earnings of the company are less than 2 per cent of its gross receipts. The differences in the power used likewise affect the financial results materially. Generally speaking, those cities which have introduced

electric traction on an extensive scale seem to show favorable operating results. In Glasgow, which was the first city in Great Britain to undertake municipal operation of street railways, the ratio of operating expenses, which include a considerable amount for taxes, to operating earnings is 47.7 per cent. It is impossible here to enter into the merits of the discussion which has been waged as to the correctness of the accounting methods in connection with municipal street railway operation in this or other British cities. The question as to the financial success of public operation in Great Britain is a disputed one, both in that country and in our own. It is difficult to escape the conclusion, however, that many of the municipal railways are operated efficiently and economically.

The streets in central London are for the most part so narrow and crowded that the operation of surface cars upon fixed tracks would be practically impossible. The more flexible movements of the omnibus give it an advantage, and the tramways are confined to the outlying parts of the city. The limitations on the duration of franchises, together with the uncertainty as to the effect of the competition of new underground railways, have prevented the introduction of electric traction on the London surface tramways. The four underground railways in London furnish a more important means of transportation than the surface tramways, the average ride being much longer on the underground roads. The two steam subways have been in operation for many years, while the two electric subways have only recently been opened. The latter have proven a great success, and plans are on foot for the conversion of the steam underground roads to electric, as well as for the

construction of extensive new electric lines. The Central London Railway, one of the new electric underground roads, popularly known as the "Tuppenny tube" because of its uniform fare of 2 pence, carried 45,305,110 passengers in 1902. The elevated railway in Liverpool is also operated by electricity. It carried 10,466,726 passengers in 1902.

II.

GERMANY.¹

Comparison with United States.—Table 83 shows for the Kingdom of Prussia, and for the German Empire as a whole, the leading statistics of street railway operation for the year 1901. The statistics, which are secured through a private association, omit about 5 per cent of the trackage operated by companies which make no reports.

TABLE 83.—Trackage, traffic, and financial statistics of street railways in Germany and Prussia: 1901.

[Returns of Union of German Street and Light Railway Administrations in *Zeitschrift für Kleinbahnen*, February, 1903.]

	Germany.	Prussia.
Length of line (first main track), miles ¹	1,867	1,316
Capital investment ²		\$115,045,154
Capital per mile of line.....		\$77,786
Number of passengers.....	1,191,457,000	799,950,000
Car mileage.....	³ 217,171,429	⁴ 140,359,006
Passengers per car mile.....	5.49	5.70
Gross earnings.....	⁵ \$29,535,800	⁶ \$18,752,258
Operating expenses, excluding taxes.....	⁵ \$17,850,000	⁶ \$11,424,000
Ratio of expenses to earnings, percentage.....	60.4	60.9
Gross earnings per car mile.....	\$0.136	\$0.134
Operating expenses per car mile.....	\$0.082	\$0.081
Passenger earnings per passenger.....	\$0.024	\$0.022

¹ According to government returns for March 31, 1902, 2,030 miles in Germany and 1,479 miles in Prussia, respectively.

² Based on government returns covering 1,479 miles.

³ On 1,815 miles only.

⁴ On 1,283 miles only.

⁵ On 1,815 miles only, the expenses for about 4 per cent of which are estimated.

⁶ On 1,283 miles only, the expenses for about 4 per cent of which are estimated.

The length of line (first main track) in the German Empire was 1,867 miles in 1901, or about one-ninth the length of line in the United States. The government figures for March 31, 1902, however, report 2,030 miles of line. Since the street railways of Germany are chiefly confined to cities of considerable size, a very large proportion of the lines are double tracked. It is probable that the trackage in Germany is between one-sixth and one-seventh as large as that in the United States.

The number of passengers carried by the German street railways in 1901 was 1,191,457,000, or about one-fourth as many as in the United States. The population of Germany in 1900 was 56,367,178, the average number of street railway rides per inhabitant being 21. A somewhat larger proportion of the German people live in cities than is the case in this country. In 1896 the population living in urban communities of more than 2,000 inhabitants was 49.9 per cent of the entire

population. If to the urban population in places of more than 4,000 inhabitants in the United States be added the population of incorporated places of from 2,500 to 4,000 inhabitants we have a total equal to 39.8 per cent of the aggregate population. It is probable that the inhabitants of German urban communities of 2,000 inhabitants and over, as a whole, take on an average about one-fourth as many rides as the inhabitants of urban communities of the same size in the United States. Such comparisons are, however, necessarily very unsatisfactory, because of the difference in method of computing urban population and in its distribution among places of different size, as well as because of differences in the density of population within urban boundaries, and other reasons.

The number of passengers per mile of track is considerably greater in Germany than in the United States and the number of passengers per car mile (5.49) is also greater. The average size of the German cars is less than that of the American cars, and it is believed that the majority of them are not double decked. The large number of passengers per car mile probably means, therefore, that the average length of ride is much less in Germany than in this country. For this reason the fares on the German street railways, which average 2.4 cents per passenger, can not properly be compared closely with American fares.

The financial results of the operation of the German street railways are very favorable. The operating expenses per car mile are much less than in the United States, a fact largely due to the low level of wages. The capitalization of the German street railways is also much less per mile than in the United States.

The street railway business has been very rapidly developed in Germany during the past few years, as the result of the introduction of electric traction. Prior to that time the trackage had been almost wholly confined to a few large cities. Development was doubtless hindered in some measure by the limitations on the duration of the franchises, but the leading German cities wisely showed a disposition to extend grants on condition of the substitution of electric for animal power. At the end of 1901 only 3 per cent of the entire trackage of street railways was operated by animal power exclusively. About 6 per cent of the trackage was still operated by steam, although on some of this track electricity was also used in part. The rapid development of railways has been materially fostered by the manufacturing companies in the electric business, as well as by two or three large investment companies, whose chief object has been the establishment of street railways in various towns. The General Local Street Railway Company, for example, owns 125 miles of track in 11 different places. Siemens & Halske and Schuckert & Company, manufacturing electric concerns which have been combined recently, own several different

¹ Statistics from *Zeitschrift für Kleinbahnen*, February, 1903.

street railways. Such manufacturing companies are also largely interested in the stock of street railway companies which they do not own entirely.

Municipal ownership.—During the past few years there has been a marked tendency toward municipal ownership of street railways in Germany. The length of lines owned by municipalities was 315 miles in March, 1902, an increase of nearly one-fourth above the amount so owned in March, 1901. The municipalities which own street railways operate them directly in most cases, though in a few instances they are leased. The total number of municipal plants in 1902 was 34, and the most important cities in which they existed were Cologne, Düsseldorf, Munich, Frankfurt, Mannheim, Aix la Chapelle, Mülhausen, and Halle. The city of Berlin owns one of the less important systems, about 11 miles in length. The large city of Nuremberg has also recently bought one line from a private company, and the

same is true of Dresden, but the leading systems in both these cities are still under private ownership.

Very few of the street railway systems covered by the above table do an interurban business of any importance, although the electric lines reach fairly well the immediate suburbs of the great cities. Germany has a considerable number of light steam railways and some of these are now beginning to install electric traction, about 6 per cent of the "light railways" (Kleinbahnen) now using electric motors in whole or in part. These light railways, unlike American interurban lines, are not intended primarily for passenger traffic. They serve largely for the local transportation of agricultural products. The total length of line for railways of this class was 4,153 miles in 1902.

Individual cities.—Table 84 shows, for the most important cities of Germany, the detailed statistics of street railways.

TABLE 84.—TRACKAGE, TRAFFIC, AND FINANCIAL STATISTICS OF STREET RAILWAYS IN THE LEADING CITIES OF GERMANY: 1901.

[Compiled from Zeitschrift für Kleinbahnen, February, 1903.]

CITY.	Popula- tion served. ¹	Length of line (miles).	Length of track (miles).	Length of track per 1,000 population (miles).	Number of passengers carried.	Number of rides per inhabit- ant.	Car mileage.	Passen- gers per car mile.	Gross earnings.	Operating expenses, excluding taxes.	Ratio of expenses to operat- ing earn- ings (per- centage).	Passen- ger earn- ings per passen- ger (cents).	Capital invested.
Berlin	2,528,000	217.8	435.5	0.172	329,982,096	130.5	50,840,000	6.5	\$7,813,300	\$5,073,685	64.9	2.3	\$29,916,458
Breslau	423,000	26.9	63.7	.151	31,878,646	75.4	5,072,000	6.3	703,385	435,300	61.9	2.1	3,136,316
Düsseldorf	214,000	40.3	66.6	.311	21,476,768	100.4	3,517,000	6.1	515,270	406,720	78.7	2.2	.....
Nuremberg	261,000	16.2	31.4	.120	17,752,740	68.0	3,343,000	5.3	396,985	208,725	52.6	2.2	1,499,400
Hamburg and Altona	867,000	92.0	174.8	.202	108,325,350	124.9	20,590,000	5.3	2,857,430	1,774,290	62.1	2.6	13,118,322
Hanover and Linden	286,000	99.3	181.2	.634	26,404,834	92.3	5,427,300	4.9	869,176	567,630	65.3	2.6	9,947,296
Leipzig	455,000	63.1	131.8	.290	65,093,043	143.1	12,969,000	5.0	1,432,046	886,550	61.9	2.2	8,098,931
Frankfurt	288,000	26.8	53.4	.185	50,422,465	175.1	7,425,000	6.8	1,090,515	676,775	62.1	2.1	2,310,590
Munich	500,000	29.5	67.5	.135	52,590,256	105.2	7,348,000	7.2	1,158,110	732,802	63.6	2.2	2,517,661
Cologne	372,000	34.7	66.5	.179	30,970,673	83.3	4,146,000	7.5	782,984	491,531	62.8	2.5	2,500,601

¹ As stated in Zeitschrift für Kleinbahnen, includes total area served.

The German cities, almost without exception, show a much smaller proportion of track to population than the American cities. In Berlin, for example, the length of track per thousand of population is 0.172 mile, as compared with 0.37 in New York. The Hanover and Düsseldorf systems include a large amount of interurban trackage and can not properly be compared with those in other cities. The lower ratio of trackage to population served is, in considerable measure, attributable to the fact that the German cities are very closely built, a large proportion of the people living in large tenement houses. This condition has, indeed, been caused in part by the inadequacy of transportation facilities, but it is due partly to other causes of an historical character. There is a comparative absence of suburbs and of thinly settled outlying districts within the limits of the leading cities.

The number of passengers carried per mile of track is very large in most of these cities, exceeding the number in cities of corresponding population in the United States. The number of rides per inhabitant, on the other hand, is, in most instances, considerably smaller than in American cities of the same size. The greatest

patronage of street railways is found in the wealthy city of Frankfurt, where an average of 175 rides is taken yearly by each inhabitant. The number of passengers per car mile is considerably larger in most German cities than in cities of corresponding size in the United States, chiefly because of the fact that the average ride is materially shorter than in this country. The capital invested per mile of track is much less than the net capital liabilities per mile of track in the large cities of America. In Berlin, for instance, the capital per mile of track is \$68,695, as compared with \$259,542 for the surface railways of New York city. The German city governments exercise the closest supervision over the issue of securities by railway companies as well as over fares and conditions of service.

The average rate of fare in the German cities covered by Table 84 ranges from 2.1 cents to 2.6 cents. To some extent, the German street railways still follow the practice of charging fares according to distance, but the tendency is distinctly toward the substitution of a uniform fare, at least within the limits of the leading municipality served. Thus in Berlin the uniform fare within the city limits is 10 pfennigs, or 2.38 cents.

Even where the system of charging according to distance exists in Germany, it often happens that much the greater proportion of the rides taken are for distances represented by the lowest rate of fare. Thus, on the railway system which serves Hamburg and the adjacent city of Altona, the minimum fare is 10 pfennigs. This covers any two of the established zones, the zones varying in length from about 0.6 mile in the central part of the city to 1.9 miles in the outskirts. For each two additional zones, an extra charge of 5 pfennigs is made, the maximum fare being 30 pfennigs, or a little over 7 cents. In 1900, 70.8 per cent of the passengers on this railway paid the 10-pfennig fare only, and 26 per cent paid 15 pfennigs, while only a little more than 3 per cent of the passengers paid higher fares.¹

In Chapter IX reference has been made to certain interesting provisions of the street railway franchises in Berlin and Hamburg. Somewhat similar requirements as to compensation to the local authorities for the privileges conferred exist in various other German cities.

III.

FRANCE.

Table 85 presents a summary of the available statistics for French street railways in 1901, and also shows the statistics for the department of the Seine, which includes Paris, and for several of the leading cities of the country.

The French official statistics recognize three groups of tramways. The first group, officially designated as "tramways for passengers and freight," comprises 1,872 miles of line and is not included in the table. The

¹ Vellguth, "The Street Railway Company of Hamburg," Street Railway Journal, January 4, 1902.

railways of this group are mostly operated by steam and correspond roughly to American narrow gauge steam railways. Railways of the second group are officially designated as "tramways for passengers, baggage, and express," and are similar to American interurban lines. The total length of first main track of this class of railways is only 156.5 miles. The greater part of their business is the carrying of passengers. Somewhat more than half of these companies use steam power, and most of the remainder use electric power with the overhead trolley. The group of street railways proper, "tramways for passengers only," is mostly confined to the large cities and their immediate suburbs. The total length of line for both groups is 1,173.3 miles, or about one-fourteenth of the mileage in the United States. The population of France is about half that of the United States, and the ratio of urban to rural population is roughly the same as in the United States. Nearly one-fourth of the total length of line in France lies in the department of the Seine.

The French street railways report a cost per mile of road of \$97,000, which is much less than the capitalization of American railways. Moreover, it should be remembered that the greater part of the trackage in France is located in the larger cities where the cost is higher than in small towns.

The total receipts of the French tramways are \$16,963,000, or about one-fifteenth of the receipts of American street and electric railways. The receipts of the Paris companies are greater than those of all the other companies combined, notwithstanding the fact that the omnibuses in Paris carry nearly as many passengers as the tramways. The receipts per mile of line for France as a whole, \$14,460, are slightly less than in the United States, where they average \$15,103.

TABLE 85.—TRACKAGE, TRAFFIC, AND FINANCIAL STATISTICS OF STREET RAILWAYS IN FRANCE AND IN LEADING FRENCH CITIES: 1901.

[Statistique des Chemins de fer Français, Documents Divers, 1901.]

	Popula- tion, 1901.	Length of line (first main track) constructed, miles.	Length of line oper- ated, miles.	Cost of con- struction.	Cost per mile of line.	Gross re- ceipts. ¹	Expenses. ¹	Ratio of ex- penses to receipts (percent- age).	Gross re- ceipts per mile of line con- structed.
France	38,961,945	1,173.3	1,280.1	\$114,218,000	\$97,000	\$16,963,000	\$13,812,000	81.4	\$14,460
Tramways for passengers and baggage		156.5	157.8	6,503,000	42,000	795,000	681,000	85.7	5,080
Tramways for passengers only		1,016.8	1,122.3	107,715,000	106,000	16,168,000	13,131,000	81.2	15,900
Department of the Seine	3,669,930	285.1	380.7	46,344,000	163,000	8,230,000	7,218,000	87.7	28,870
Other departments	35,292,015	731.7	741.6	61,371,000	84,000	7,938,000	5,913,000	74.5	10,850
Marseille and vicinity ²	491,161	53.4	71.4	8,649,000	162,000	1,053,000	866,000	82.2	19,720
Lyon and vicinity ²	459,099	80.1	87.6	6,414,000	80,000	1,376,000	1,010,000	73.4	17,180
Bordeaux and vicinity ²	257,638	62.1	52.8	7,108,000	114,000	872,000	637,000	73.1	14,040
Lille	210,696	42.2	55.3	3,057,000	72,000	475,000	347,000	73.1	11,280
St. Etienne	146,559	24.2	24.2	1,115,000	46,000	269,000	205,000	76.2	11,160

¹The reports do not distinguish between operating earnings and expenses and other receipts and expenses.

²Population of city named only.

The ratio of expenses to receipts on French tramways for passengers only is 81.2 per cent, apparently a much higher ratio than in the United States. The reports do not show clearly what is covered by the term "expenses," and it is quite probable that they include

taxes, and perhaps interest on bonds as well; in which case comparison of the ratio mentioned with that of operating expenses to operating earnings on American railways would be wholly misleading. In the department of the Seine, the ratio of expenses to receipts is

larger still, and the companies in that department complain that their business is scarcely profitable. This is probably due largely to the fact that most of the traffic in the densely populated center of Paris is carried by omnibuses, the street car lines being in the main confined to the outlying districts. Moreover, up to 1901, fully half of the street car lines in Paris were still operated by horsepower, while on most of the others the expensive accumulator system was employed. Paris, indeed, shows probably a greater variety of methods of traction than any other city in the world. The underground trolley is used on a small amount of track; compressed air, ordinary steam locomotives, and locomotives operating with superheated steam without fire are also employed. The more important tramways of Paris belong to the same company which operates the omnibuses. Many new street railway lines were constructed in anticipation of the Exposition of 1900. The subway system of Paris, which is owned by the city, but operated by a private company, is not included in the statistics of tramways. The first line running nearly straight from one end of the city to the other, following the line of the Champs Elysées, was opened in 1899. Other lines are being rapidly constructed. This system is operated by electricity on the multiple-unit plan. It has proved highly profitable, and has cut deeply into the receipts of the tramways.

Recent statistics of the number of passengers carried in Paris are not available. In 1899, the surface tramways in that city carried 173,866,684 passengers. (This figure does not include one company of minor importance.) The number of passengers carried by the omnibus lines was 137,004,054, while the electric subway, which was in operation only part of the year, carried 15,887,873 passengers, making a grand total of 326,758,611.¹ The population of Paris proper in 1901 was 2,714,068. The traffic of the tramways and omnibuses is therefore much less in proportion to population in Paris than in the leading cities of the United States. It should be added, however, that in Paris, as in many other continental cities, there is an immense number of cabs with fares which are but a small fraction of those charged in American cities. A considerable share of the traffic which would here patronize the street cars is carried in cabs in Europe.

The development of street railways in the other leading cities of France is also very much inferior to that in cities of corresponding size in the United States. Most of the tramways outside of Paris, however, are now operated by electricity and very rapid development is taking place. According to *L'Industrie Électrique*, there were in France, at the beginning of 1903, 1,995 kilometers of line operated by electricity, and 3,004

electric motor cars, as compared with 487.5 kilometers of line and 759 motor cars in 1899. These figures presumably include the trackage of the tramways for passengers and freight which are not covered by the preceding tables.²

IV.

AUSTRIA.³

The following statement presents statistics relating to the street railway business in Austria for the year 1900:

Length of line (first main track), miles:	
Total	231.5
Electric	158.2
Cable	.6
Horse	72.7
Receipts, total ¹	\$2,137,066
Expenditures, total	\$1,518,977
Ratio of expenditures to receipts, percentage	71.1
Passengers	74,268,082
Car mileage	11,180,386
Passengers per car mile	6.64

¹ Items included are not indicated.

The most extensive electric system is in Vienna and its environs, which had 37 miles of electric road in 1900, with additional lines under construction. The number of passengers carried in 1900 was 29,382,521, the receipts, \$823,410, and the expenses \$644,854. As in the case of the statistics for the country as a whole, it is not clear what is included in the item "expenditures," but they apparently include taxes. Vienna has a population of about 1,200,000.

Altogether there are 22 electric railways in Austria, practically all doing an exclusively urban business as distinguished from an interurban business. Private ownership prevails.

V.

HUNGARY.⁴

The following statement shows for 1900 statistics of the Hungarian street railways, which are practically all electric lines operated by private companies:

Length of line, miles	156.5
Number of passenger cars	908
Passengers carried	77,860,372
Passengers per mile of line	497.510
Capital invested	\$16,451,181
Receipts	\$3,063,493
Expenditures ¹	\$1,808,958
Ratio of expenditures to receipts, percentage	59

¹ Items included are not indicated.

Budapest, the capital of Hungary, stands very high among European cities in its street railway enterprise. The total number of passengers carried by the railways in this city in 1900 was 69,875,654. There were 68 miles of line, practically all electric. The leading company has a system 37 miles in length, in which it has invested \$7,475,000; the receipts in 1900 were \$1,748,000;

² Street Railway Journal, November 21, 1903.

³ Statistik der Electricischen Eisenbahnen, Drahtseilbahnen, und Tramways mit Pferdebetrieb, 1900.

⁴ Ungarisches Statistisches Jahrbuch, 1900, page 217.

¹ Annuaire de la Ville de Paris, 1900, page 447.

expenditures, \$876,000, showing a ratio of operating expenses to receipts of only 50.1 per cent. Budapest was the first city in the world to use the underground trolley system, her first lines dating from 1889. There is also a subway railroad in this city.

VI.

NETHERLANDS.¹

In addition to the strictly urban railways in the Netherlands there are numerous steam tramways connecting towns, similar to those in France and Italy. Their statistics are not separable from those of the animal power and electric roads in the cities. The chief business of these interurban lines is the carrying of passengers. The total length of line of all street railways and tramways in 1901 was 983.2 miles; the number of passengers, 65,932,000; and the gross receipts \$2,839,700. Private ownership of street railways prevails in the Netherlands.

In Amsterdam there were, in 1899, 21 miles of street railway, partly operated by horses; in 1901 there were 1,422 horse cars and 1,135 electric cars. In Rotterdam there were, in 1899, 73 miles of tramways, but this trackage apparently includes some of an interurban character. In The Hague there were, in 1899, 21 miles, including steam, animal, and electric traction.

VII.

BELGIUM.²

In 1901 tramways were found in only 5 Belgian cities, and in only 2 of these, Liege and Verviers, were they operated by electric traction. All the lines are operated by private companies. In Brussels steam traction is used to some extent.

The following statement shows for 1900 the length of line and number of passengers carried in the 4 cities making reports:

CITY.	Length of line (miles).	Passengers.
Brussels.....	9.50	10,154,000
Liege.....	18.00	7,792,000
Louvain.....	.62	383,000
Verviers.....	7.50	2,492,000

VIII.

SWITZERLAND.³

The statistics of Swiss street railways do not include the various cable and rack and pinion railways found in the mountains.

¹ Statistiek van het Vervoer op de Spoorwegen en Tramwegen, 1901; Jaarcijfers voor het Koninkrijk der Nederlanden, 1900, page 219.

² Annuaire Statistique de la Belge, 1901, page 385.

³ Statistisches Jahrbuch der Schweiz, 1901, page 120.

The following statement shows the chief statistics of the Swiss railways for 1899:

Length of line (first main track), miles.....	109.7
Passengers carried.....	43,151,680
Car mileage.....	13,646,182
Passengers per car mile.....	3.16
Receipts.....	\$1,069,041
Expenditures ¹	\$811,383
Ratio of expenditures to receipts, percentage.....	75.9
Capital invested.....	\$4,669,789

¹ Items included are not indicated.

In 1899 electric traction was employed on 23 of the 27 systems reporting, and horses were employed on 5 of the systems.

The most extensive street railway system is found in Geneva, which has about 13 miles of line, with 6,814,316 passengers in 1899. In Basel there are 7.4 miles of street railway line, and the number of passengers was 7,474,920 in the same year.

IX.

ITALY.⁴

The only available statistics regarding Italian street railways cover those operated by mechanical traction, but not those operated by animal power of which a number exist. They include a considerable number of interurban tramways, operated by steam, which do primarily a passenger business, but also some freight business. The first of these interurban tramways was established in 1878. They are operated for the most part on the public highways.

The total length of line (first main track) of the street railways and interurban tramways operated by mechanical traction in 1900 was 1,930 miles, of which 105 miles only were operated by electricity, practically all the rest being operated by steam. In Rome and its immediate environs there were 30 miles. In the city limits of Milan there were 53 miles, of which 34 were operated by electricity. The street railways of Italy are ordinarily owned by private companies, but those in Milan are owned by the city and leased, on very favorable terms, to an operating company.

X.

SPAIN.⁵

In Spain, as in Italy, there are a considerable number of so-called tramways (tranvia) which operate between cities and towns, and use chiefly steam as the motive power. Street railways proper are found in a number of cities and operate chiefly by animal traction, though electric traction is found in Madrid, Valencia, and two other cities.

The total length of the street railways and tramways in 1900 was 347 miles, of which 23 miles were in Madrid.

⁴ Annuario Statistico Italiano, 1900.

⁵ Estadística de las Obras Públicas, 1901, page 375.

STREET AND ELECTRIC RAILWAYS
PART II

STREET AND ELECTRIC RAILWAYS.

PART II.

By THOMAS COMMERFORD MARTIN, Expert Special Agent.

CHAPTER I.

HISTORY AND DEVELOPMENT OF ELECTRIC TRACTION.

The early technical history of street railways in America has little direct connection with the problems of traction as they exist at the present time, for, while there are some technical features which are evolutionary and reveal descent from a long line of methods and principles, the sudden change of motive power from horses and mules to electric motors, with but a brief intervening period of cable development, has brought about an entirely new set of conditions. It follows that while the earlier ante-electric history might be studied for its own sake, it embodies very little of pertinent interest and instruction in the study of the modern street railway systems of the United States.

In connection with the text which follows it is deemed proper to say that a great many authorities have necessarily been consulted, although, from 1877 onward, the facts lie very largely within the personal observation of the writer of this report. Among the books quoted are Wright's *American Street Railways*, Fairchild's *Street Railways*, Dawson's *Electric Railways and Tramways*, Martin and Wetzler's *Electric Motor and its Applications*, Crosby and Bell's *The Electric Railway*, Bell's *Power Distribution for Electric Railroads*, Pratt and Alden's *Street Railway Roadbed*, Clark's *Tramways*, Rider's *Electric Traction*, Gotshall's *Electric Railway Economics*. In addition to these may be mentioned, for their value in regard to technical data, Herrick's *Practical Electric Railway Handbook*, Foster's *Electrical Engineer's Pocketbook*, and Dawson's *Electric Traction Pocketbook*. These have been supplemented by numerous governmental reports, which bear more or less directly on the subject, such as that of Capt. Eugene Griffin, United States Engineers, United States Senate Miscellaneous Document No. 84, Fiftieth Congress, first session, which is believed to be the first governmental report dealing with the subject in this country. These documents have also been sup-

plemented by citations from the columns of the electrical and technical press, particularly the files of the *Street Railway Journal*, *Annual American Street Railway Investments*, issued by that journal, as well as the transactions of the American Street Railways Association and kindred national and state societies.

In the third decade of the last century a lumbering omnibus car, called the "John Mason," of which an early engraving is here presented, was drawn by horses over strap rails laid on stone ties through Fourth avenue, New York city. This constituted the first passenger street railway ever constructed. Some twenty years later the Sixth Avenue Railroad of New York city was built, and its moderate success gave great encouragement to further development. Between 1850 and 1855 half a dozen roads were constructed; 30 in the next five years; over 80 between 1860 and 1870; and at the time of the census of 1890 there were 769 street railways in operation in the leading cities of the country.

The cable system, which the present statistics show to be almost obsolete in this country, was introduced in August, 1873, but enjoyed barely a quarter of a century of useful application. For a time it promised to be the dominating factor in the field wherever the traffic was dense enough to recoup the enormous outlay on construction and the heavy cost of operation, leaving to the horse and the mule, or an occasional dummy steam locomotive, all the other lines where passenger traffic was light.

The main ideas of the cable system were suggested at an early date by E. S. Gardiner, of Philadelphia, but the real beginning of this stage of street railway traction dated from the work in San Francisco of Andrew S. Hallidie and his coworkers, Asa E. Hovey, William Eppelsheimer, and Henry Root. It may be noted in passing that the essential principles of the cable system

involved a cable traveling in a slotted tube operated by distant driving machinery, and a cable grip, by means of which the car attached itself to the motive cable. Upon this plan and its variations, more than one thousand patents were issued in the United States up to 1890-91, when the superiority of electricity as a motive power had been demonstrated so thoroughly that no new cable system of any kind for any purpose has since been proposed, or is likely to be seriously considered. An immense amount of ingenuity was displayed in the development and perfection of cable systems, and they served the public admirably in many ways, giving facilities never previously enjoyed and suggesting what might be done in the future to afford the dense population of modern cities greater freedom of movement. Moreover, the success of the cable was largely responsible for the welcome which capitalists and engineers gave to the first crude trials of electric traction.

It is an interesting problem to explain why the value of electricity as a motive power was so slowly recognized. The earliest efforts to apply the electric motor to locomotive purposes antedated the beginning of the cable and synchronized with the earliest attempts to utilize steam power, but it was not until fifty years after both of these methods of traction had been put into use that the electric street car or the electric locomotive could be pronounced a definite success. There is but one explanation sufficient to account for the long period of failure and disaster attending the introduction of electric traction—namely, the want of an adequate supply of cheap current with the appropriate methods for its distribution and delivery to the governed vehicle. In some of the earliest attempts the electric vehicle was self contained. In other words, the motor was attached in various ways to the revolving axle and derived its supply of current from primary batteries carried on the vehicle itself. Thus, for example, in the pioneer work done by Thomas Davenport, a blacksmith, of Brandon, Vt., this method was illustrated in his working model. Davenport not only patented electro-magnetic power as a governing principle, but in the autumn of 1835 set up a small, circular railway in Springfield, Mass., over which he drove an electro-magnetic engine.

Prof. Moses G. Farmer, a distinguished American inventor and investigator, in 1847 constructed and exhibited in public an electro-magnetic locomotive drawing a little car that carried passengers, back to back, on a track a foot and a half wide. For this he used 48-pint cup cells of Grove nitric acid battery; and the mere statement of this fact will suggest even to the uninitiated the costliness and clumsiness of such methods. In 1850-51 Mr. Thomas Hall, of Boston, exhibited a small working motor on a track 40 feet long, at the Charitable Mechanics Fair in Boston, and while this was a mere toy, and used but a couple of cells of battery, it sufficed to illustrate the principles of a motor or locomotive with a single trail car. About this time

(1847) an interesting demonstration was also made with a small working model, of one of the features which has been most instrumental in the success of modern electric methods, that of the utilization of the track as part of the return circuit for the current. Doctor Colton, once a famous dentist in New York city, and noted for his early application of laughing gas in that work, was associated with a Mr. Lilly in the construction and operation of a small model locomotive which ran around a circular track. The rails were insulated from each other, each connecting with one pole of the battery. The current from the battery was taken up by the wheels, whence it passed to the magnets, upon whose alternating attraction and repulsion motion depended; then it returned to the other rail, connected to the other pole of the battery, and thus completed the circuit necessary for the flow of the current. In like manner, in the vast machinery of the electric systems enumerated in this report, the current passes from the power house to circuits of one polarity, through the trolley pole to the motor or electro-magnetic propelling system, thence through the wheels to the track, which completes the circuit by being connected to the other pole or side of the dynamo at the power house. The principles are obviously identical, but it took more than a quarter of a century to develop the proper method of application in all its details.

The most serious and sustained attempt in the early period to operate a self-sustained vehicle or car—which would correspond with the storage battery cars, a few of which are enumerated in this report—was that due to Prof. C. G. Page, of the Smithsonian Institution. About 1850 Professor Page devoted considerable time and attention to the development of electric engines or motors, in which the reciprocating action of a system of magnets and solenoids or armatures was applied by crank shafts to driving a fly wheel, to which rotary motion was thus imparted. This reciprocal motion, as in steam engines, was one of the prevailing features of the early electric motor work in this country and in Europe; but it was not long before its general inapplicability was realized and it was abandoned for the simpler and more direct rotation of the armature before or between the poles of electro-magnets.

On April 29, 1857, with an electric locomotive on which he had installed a large reciprocating motor developing over 16 horsepower, Professor Page made a trial trip along the track of the Washington and Baltimore Railroad, starting from Washington. In order to obtain current for energization, the motor was equipped with 100 cells of Grove nitric acid battery, each having as one element a platinum plate 11 inches square dipped in the acid. Bladensburg, a distance of about 5½ miles, was reached in thirty-nine minutes, and a maximum speed of 19 miles an hour was attained; the entire trip to and from Bladensburg occupied one hour and fifty-eight minutes. But many disasters happened



THE "JOHN MASON" ORIGINAL STREET CAR.



A "BOSTAIL" CAR STILL IN USE IN 1902 AT DECATUR, ALABAMA.

to the batteries. Some of the cells cracked wide open, and jolts due to inequalities of track threw the batteries out of working order. These experiments must have been extremely costly, and no little discouragement among people in general attended this failure; but Professor Page was not daunted, and for some years continued his work on electric motors, displaying great ingenuity, but not able, apparently, to give up the reciprocating principle.

Another inventor of the early period, whose work should not be overlooked, was Henry Pinkus, who appears to have proposed and provisionally patented, as far back as 1840, the idea of a railway whose motors should pick up their current from the rails. To his work many later inventors were referred by the Patent Office. He, as well as a great many others for several years thereafter, had to endure failure because the dynamo had not as yet been invented. The invention of the dynamo replaced the primary battery as the source of current for the electric railway, and a basis of operation was reached by which the cost would compare favorably with that of vehicles propelled along tracks by the direct application of steam.

The invention of the dynamo was the great and sufficient reason for the upgrowth of the modern industries which depend upon a large consumption of electric current. This fact is brought out by the figures of the census of 1900 in regard to electrical manufactures, where it is shown that of apparatus valued at least at \$100,000,000, more than 75 per cent belongs in classes that were unavailable to the public in the days of the primary battery, and that still would be altogether inaccessible if the sources of current supply were little cells with metallic elements dipped in acid solution, yielding current in small volume and at feeble pressure.

Following promptly upon the commercial exploitation of the early magneto-electric and dynamo-electric generators came a sharp renewal of the efforts to perfect the electric railway. These efforts were made on both sides of the Atlantic, the work which attracted the most attention being, perhaps, that of Dr. Werner Siemens at Berlin in 1867 and, about ten years later, of Siemens and Halske. In the meantime efforts were being made in the United States, and in 1879 Mr. Stephen D. Field elaborated plans for an electric railway substantially the same as that soon afterward put in experimental operation by him at Stockbridge, Mass. At this stage of the development of electric railways the problem again arose with regard to the transmission of current from the source of energy to the traveling motor. Instead of using one rail as the receiving part of the circuit to the motor, and the other rail as the return part of the circuit, the idea was conceived of employing a third rail to receive the current, leaving the two outside rails for the return. This third rail was sometimes placed between the two traction rails for contact purposes, sometimes outside them on the same level or raised on short posts, and in some cases,

as in mines, was placed above the car or locomotive in the manner of an inverted letter T so that the current could be taken off by some form of traveling contact. The demonstrations with the third-rail method were certainly successful, although the various parts of the apparatus would be regarded at the present time as very crude and cumbersome. It was something, however, that a start had been made and that stimulus had been given to the imaginative powers of American inventors, and it was not long before new electric railway inventions and projects were appearing all over the country.

Some of the work which at this time attracted notice was that of Mr. Thomas A. Edison, who made various interesting experiments in electric railways, which he demonstrated upon a little road built at Menlo Park, N. J. There, during the period from 1880 to 1882, Mr. Edison developed a series of electric railway motors and locomotives which were actually employed in carrying many thousand people and a considerable amount of freight. The records show, that according to a contract made between Mr. Edison and Mr. Henry Villard, in 1881, the former was to build not less than 2½ miles of electric railway at Menlo Park, equipped with three cars and two locomotives, one locomotive for freight and one for passengers, the latter having a capacity of 60 miles an hour. The capacity of the freight engine was to be the hauling of 10 tons net of freight at a cost for power per ton mile less than that of the ordinary steam locomotive. If the experiments were successful Mr. Villard was to pay the actual outlay and to negotiate for the installation of at least 50 miles of electric road in the wheat regions of the northwest. According to Mr. Edison, Mr. Villard paid out nearly \$40,000 on account of the work, and there is reason to believe that the work would have gone further had not the Northern Pacific Railroad, with which Mr. Villard's fortunes were then associated, gone into the hands of a receiver. In Mr. Edison's experiments the electric locomotives were built along the usual lines of the steam locomotives, and equipped with cowcatcher, headlight, cab, etc. The motive power was at first applied from the motors to the axle by means of friction pulleys, but this method was found to be unsatisfactory, and in later efforts belts were employed. The armature shafts were belted to a large pulley and countershaft, another belt driving from a small pulley on the countershaft to a larger pulley on the car axle. In operation, the pulleys slipped a great deal before the locomotive actually started, and this led to the introduction of resistance boxes, which were placed upon the locomotive in series with the armature. The locomotive was started with three resistance boxes in circuit, consuming in heat part of the current. After normal speed had been attained, the operator could plug or switch the various boxes out of the circuit, and in this way gradually increase the speed. As a further step, Mr. Edison, finding that

the resistance boxes were in the way, had some copper wire wound on one of the legs of the motor field magnet. In this way the resistance was put where it occupied the least room, and where it served also as an additional field coil in starting the motor. Various other developments and improvements were gradually introduced until the cessation of the work in 1882; but throughout the whole period current was fed to the motor through the track, and was supplied to the road by underground feeder cables from the dynamo room of the laboratory. In order to insulate the track from the ground, the rails were insulated from the ties by giving them two coats of japan varnish, baking them in the oven and placing them on pads of tar impregnated muslin laid on the ties. The ends of the rails were electroplated and not japanned, so as to afford good contact surface for the fish plates, and for the copper bonds, which were added to increase the electric continuity of the track circuit.

Early in 1883 the electric railway interests of Messrs. Field and Edison were brought together into the hands of one company. Soon after, at the Chicago Railway Exposition of that year, an electric railway was put in operation by Messrs. Field, C. O. Mailloux, F. B. Rae, and others, which still employed, however, the third-rail method. A circular track nearly a third of a mile in length, 3-foot gauge, ran along the gallery of the building and the locomotive, named "The Judge" after Chief Justice Field, hauled a car along this track. During the month of June, over 26,000 passengers were carried. Similar work was done with "The Judge" at the Louisville Exposition of the following fall. In this locomotive the motor was placed crosswise on the frame so that its armature was parallel with the sills. The armature shaft had connected with it a projecting shaft which transmitted motion by means of bevel gearing to a countershaft carrying two pulleys. These pulleys transmitted power by means of belts to the pulleys on the axles of the drivers. It will be observed that in this experiment, as in Edison's, the motor was placed above the floor of the car and not underneath it. An average speed of 8 miles an hour was made and a maximum speed of 12. The locomotive included original devices for controlling the current depending upon the resistance of a suitable rheostat to be cut in and out of the main circuit. The locomotive was 12 feet long and 5 feet wide and weighed about 3 tons. Current was picked up from the service or feed rail between the two outside rails by means of a traveling "vise," in the jaws of which were inserted bundles of phosphor-bronze wire so arranged, obliquely downward and inward, that whichever way the car moved, forward or backward, a good clean contact would be made on each side of the rail.

Another of the workers in the early eighties was Mr. Leo Daft, an Englishman, who was one of the first to make a commercial business of the construction of motors and of their operation from central power sta-

tions for the purpose of driving machinery in such cities as New York and Boston. After some trials of a Daft locomotive on the grounds of his company's works at Greenville, N. J., a line was constructed on the Saratoga and Mount McGregor railroad in November, 1883. This railroad was about 12 miles long with sharp curves and steep grades, and over it the locomotive "Ampere" ran, hauling a regular passenger car. As in many other instances, the motor in this case was placed above the platform of the locomotive. At each end of the armature shaft was keyed a pulley from which belts ran to large pulleys mounted on the countershaft, situated midway between the driving wheels; from the countershaft ran another set of belts to the driving wheels. The reduction of speed from the armature pulleys to the drivers was in the ratio of 8 to 1. On this road also a central rail was used to feed current to the motor, the current being picked up by small phosphor-bronze contact wheels, spring mounted to secure flexibility. During 1884 Mr. Daft built and equipped a small road on one of the long piers at Coney Island, New York's famous seaside resort, which carried 38,000 passengers in one season. In this the system of current supply was also by means of the track. A little later another Daft road was installed at the Mechanics' Institute Fair in Boston, carrying 4,000 or 5,000 passengers weekly for a month. The motor "Volta" used in Boston was then taken to the New Orleans Exposition and operated on a line about one-fifth of a mile in length, between the United States Government building and the main building. This line also carried several thousand passengers.

In 1885 Mr. Daft equipped for the Baltimore Union Passenger Railway Company a line running out through the villages of Hampden, Mt. Vernon, and Woodberry, a distance of about 2 miles, and reaching an elevation of about 150 feet above the city of Baltimore. For this branch two locomotives were built, the motors being placed low down on the floor of the car, and motion from the armature shaft to the car wheels being obtained by internal gears. At each end of the armature shaft a 3-inch phosphor-bronze gear was keyed, and these meshed with large gears 27 inches in diameter fastened to the axle of the driving wheels, the ratio of peripheral speed of armature and drivers being as 3.27 to 1. The track was equipped with a third rail to supply current, placed midway between the outer rails, which served as the return circuit. Part of the system was also equipped with an overhead trolley service. This suburban road continued in operation for some time, until it became part of a general network of electric railways equipped with more modern apparatus.

Mr. Daft, about this time, also equipped several other street railways in different parts of the country employing as a rule two overhead trolley wires, with two trolley contacts, so as to do away not only with the third rail as a means of current supply, but to obviate any use of

the track as a part of the circuit. The system of double overhead trolley, which will be referred to later, has continued in vogue in one or two places down to the present time. Throughout this period Mr. Daft was also engaged in a series of experiments on the New York elevated railroads, to which work allusion will be made elsewhere.

One of the men to whom the street railways owe much in their technical development was the late Charles J. Van Depoele, a Belgian, whose father was master mechanic for the East Flanders Railway System. Van Depoele's trade was that of a cabinetmaker, but he devoted all his leisure time to electrical experiments.

In the summer of 1869 young Van Depoele emigrated to this country and began in Detroit the manufacture of art furniture. With the income derived from his growing business he was able to indulge his taste for electricity, and soon made some of the earliest successful arc lights and dynamos for illuminating purposes. His greatest hobby, however, was the propulsion of street cars by electricity, upon which he had been working as far back as 1882. In the winter of 1882-83 Mr. Van Depoele had a short experimental line running in Chicago, and during the same year he operated a car at the Industrial Exposition in that city, taking current by means of an overhead wire. He was encouraged by the results obtained in this way, and in the fall of 1885 made a contract with the directors of the Toronto (Canada) Annual Exhibition to run, single track, a train of three cars and a motor car from the street railway terminus to the exposition, a distance of 1 mile. On this system, which was operated successfully and carried an average of 10,000 passengers per day, a speed of 30 miles an hour was attained. The track was used as the return circuit, and on top of the car was placed one of the first illustrations of the "underrunning" trolley now commonly employed. The contact wheel was carried by a pivoted beam, the latter being provided with a spring on one end pressing the wheel at the other end up against the underside of the overhead wire. A flexible cable connected this contact wheel with the switches, rheostat, and motor on the motor car. The illustrations of this old road show in crude form the modern central overhead wire, underrunning trolley and trolley poles, side bracket poles for suspending the wires, and the insulated track return.

It might be said that this was not a street railway in the strict sense of the term, although it ran through the streets. Mr. Van Depoele's next step was the equipment of a regular street railway at South Bend, Ind., where no fewer than five separate cars were operated at one time, something which had never before been attempted or even supposed possible. This road derived its current from a generating plant driven by waterpower. The equipment of the road consisted of open and closed four-wheeled cars. On each of the closed cars was placed a 5-horsepower motor, while a

large open car was equipped with a 10-horsepower motor. The motors were placed under the cars between the wheels, and the axles were connected by means of sprockets and link belt. This innovation had been found to be desirable, as the motor was in the way when above the car platform, and the distance between the armature shaft and the driven axle was too great. Moreover, the motor, when above the platform, occupied space needed for passengers. According to Mr. Van Depoele's own account of this road, a variation was attempted in the trolley contact. The copper trolley wire one-quarter inch in diameter was suspended above the track by means of cross wires fastened to poles placed near the curb. From the underside of this copper wire hung a tiny car fastened to a flexible cable, which passed to the inside of the motor car, and was there fixed in connection with the switches, motor, etc. This car or trolley on the wire traveled with the car on the track and made a perfect contact. This device, and modifications of it, were seen on other Van Depoele roads, but were soon abandoned for the underrunning contact. On some Van Depoele roads, however, a form of overrunning trolley wheel was tried, which traveled along the upper surface of the trolley wire and was held in position by means of a heavy balance weight. In 1885 Mr. Van Depoele contracted with the president of the New Orleans Exposition for a road nearly a mile long, with a carrying capacity of about 200 people, to be operated on the grounds. This was equipped with a motor car and two large open cars. The motor in this case was placed in the center of the floor of the car, the two middle seats being removed for the purpose. This line was equipped with contact wheel, upward-pressure trolleys, the wheel making contact on the underside of the overhead wire, as at Toronto. The experiment at New Orleans, La., was followed by several contracts for roads at Minneapolis, Minn., Detroit, Mich., Appleton, Wis., and Montgomery, Ala. The road at the last-named place was equipped with 12 cars and began operation in 1886.

Considerable discussion arose as to the scope of Van Depoele's work and the importance of his inventions, not a little of which related to the underrunning trolley contact, one of the features which renders the modern systems commercially practicable. It was alleged that Van Depoele had simply carried out or modified ideas and suggestions already in existence. It was asserted, for example, that in systems of electric train signaling, some kind of a trail contact device or trolley had been employed to get current or signals from an overhead conductor to the instrument on the car, and that when it came to the operation of street railways, the difference in method was unimportant.

In reply to this contention it was pointed out that many able inventors, when first confronted by the problem of overhead contact, did not avail themselves of what had been suggested or developed in the electric

railway signaling art, but started out on the new and independent line of overrunning trolleys. So far as Mr. Van Depoele's work is concerned, it may be stated here as part of the historical record that the courts sustained his claims, and that in a well-known decision Judge Townsend of the United States circuit court said:

No one can read this record without being impressed by the fact that Van Depoele was more than a skilled mechanic in the art of electrical railway propulsion. The Patent Office has raised a presumption in his favor as an inventor by the grant of numerous patents to him. Some thirty have been introduced by complainant, several of which cover highly meritorious inventions which have largely contributed to the successful practical operation of the trolley roads throughout the country. In fact, the construction covered by his earlier patent for an overhead underrunning trolley shows that he appreciated the problems involved in varying lines and curves, and to a limited extent by said device ingeniously provided for their solution.

The inventors in the art of electrical propulsion, signals, or telegraphs, had failed to provide for an operative contact device at the distance from the car required for the operation of the underrunning trolley road except by unwieldy and impracticable structures on the roof of the car. They had failed to adequately provide for considerable variations from practically straight lines of travel. In their later attempts to do so, they had constructed or adopted contrivances which departed from the earlier devices now claimed to show lack of patentable novelty, and thereby furnished strong proof that the changes made by Van Depoele were not obvious ones. Defendant's expert is forced to admit that the advantages of an underrunning trolley were not obvious and that the earlier constructors must have been in doubt as to the efficiency of such a system, and that the prior underrunning overhead devices would have led a person away from rather than toward an upwardly pressed hinged conductor. In these circumstances the new use of old principles does not fall within the rule of a double use. I have been unable, therefore, to adopt the view of counsel for defendant, that the art of conducting electricity from a conductor to a translating device on a moving vehicle was sufficient to enable the skilled mechanic to construct the device of said first patent. In respect of the underlying fundamental object and result of the paper patents for signaling devices and the Van Depoele device, the transfer was to a branch of industry but remotely allied to the other, and the effect of such transfer has been to supersede other methods of doing the same work.

That no great confidence was entertained in the early eighties as to the feasibility of the overhead contact method of obtaining current for an electric car is to be inferred from the expensive installation made in Cleveland in 1884 by Messrs. Edward M. Bentley and Walter H. Knight, and put in operation by them in August on the tracks of the East Cleveland Horse Railway Company. Two miles of the road were equipped with a little underground conduit placed between the rails and running the entire length of the road. In this conduit was placed the feeding conductor, and the high voltage current for the Brush series wound motor was picked up from it by means of a "plow," which passed through the slot in the conduit, and by sliding contact on the conductor maintained connection with the sources of power. A photograph of the first car equipped to travel over this track is here shown. It was an old

horse car equipped with a small arc lighting dynamo driven as a motor. Two other cars, with similar motor equipment, but with variations in gearing were also tried; the last being furnished with spur gearing. The body of the gears was built up of paper, like a paper car wheel, in order to deaden the noise. In the third car, also, the motor was carried by a separate truck, its shaft lying longitudinally of the car, and geared with a parallel countershaft which drove the two axles by bevel gearing. This line, which was in many respects a forerunner of the conduit systems since successfully operated in our largest cities appears to have worked very well, not only in ordinary weather, but through the unusually deep snow of the winter of 1884-85. As a matter of fact this seems to be the first regular electric street car equipment installed in America, operating for fare like the old horse cars.

The same Bentley-Knight system was laid down on Fulton street, New York city, with the contact conduit at one side instead of in the center between the rails, but for some reason this road never went into operation and was afterwards torn up. Another Bentley-Knight line was later constructed in Boston and remained in operation for some time, but was finally superseded by trolley methods, although apparently it can not be said that the relinquishment of the effort was due to any inherent fault of the underground conduit method. The time simply was not ripe for this development, nor had the prejudice against overhead wires in cities yet become so strong as to prevent the overhead network appearing even where an underground system had already shown itself sufficient to the exigencies of the case. The further important developments of the conduit system will be treated later in a discussion of this branch of the art.

At about the same time some work was being done in Kansas City, Mo., by Mr. John C. Henry, a telegraph operator of considerable ingenuity. It appears that a line had been projected to run from Kansas City to the county seat, Independence, some 10 miles away, and Mr. Henry built his little road with the idea of demonstrating the advantages of electric traction to the owners of the proposed Independence line. A number of new features were introduced, the credit for which was claimed by Mr. Henry, and which certainly belonged to the elementary stages of the practical art. Thus the plan was proposed of suspending the working conductor over the track by means of span wires supported at the side of the road, thus leaving the underside of the conductor free for easy access by the traveling contact. As a matter of fact Mr. Henry used double overhead wires, supported both by brackets and by span wire construction, the wire being No. 1 gauge of hard drawn copper. Mr. Henry was of the opinion that the use of the word "trolley," as applied to overhead wire roads, originated on his little Westport line. His first traveling contact was a little 4-wheel carriage

which gripped to and ran along the underside of the wire. It was attached to a flexible cable, which completed the circuit to the motor, and the device was trollied or hauled along by the motor car underneath. At first it was called a "troller," but the name was soon changed to "trolley" by the employees and the public. This was long before trolley roads became popularly known as such.

The motor employed by Mr. Henry was a small Van Depoele dynamo or generator, which developed about 5 horsepower. It was mounted in an iron frame with variable speed changing gears, was supported at one end on the car axle, and was engaged with gearing thereon. The front platform was lowered, permitting the commutator end of the motor to project thereon and to be spring supported. This motor was series wound; in other words, the field magnets were in series with the armature. It was regulated by the use of resistance. This road was visited and studied by a great many people, including Mr. Van Depoele and others interested in the development of the art. In the fall of 1885 Mr. Henry secured heavier machinery and moved from the Westport road to some steam railway tracks owned by the Fort Scott and Gulf Railway Company, where he experimented with high speeds, with the hauling of freight cars, and with grades and snow. In the winter of 1885-86 Mr. Henry arranged to equip the East Street Railway in Kansas City, which had a mile of track completed and upon which four motor cars were placed. Each car had a single 25-horsepower motor attached to one of the axles, the motor projecting through the car, its working parts all being in view of the motorman. The motor was connected to the car axle by planetary gear and the armature ran constantly. The car was operated by the aid of two vertical levers—one to connect or disconnect the motor from the car and the other to apply friction wheel brakes. In these motors the fields were so constructed that their resistance could be varied and the motors be regulated without separate resistance boxes, and the road was arranged to operate at a pressure of 500 volts. In 1887 Mr. Henry contracted to build several roads in southern California, all the machinery for which was built in a crude way in Kansas City. The performance was remarkable in view of the remoteness of the inventor from all the facilities necessary for good scientific work.

Coincident with the work being done at Kansas City by Mr. Henry was that attempted even farther west by Prof. Sidney H. Short, then in the physics department of the University of Denver. As early as the month of February, 1885, a company was organized, under the name of the Denver Electric and Cable Railway Company, to build and operate an electric railway in the streets of that city. An experimental track 300 or 400 feet in length was laid in a circle on the university grounds, and a small car called the "Joseph Henry" carried a great many hundreds of people over it. This

work attracted attention and led to more ambitious efforts which, however, were not successful. Mr. Short's work was interesting from its demonstration of the fact that some principles, successful in other departments of electricity, could not be applied to the street railway. There are, broadly speaking, two circuit systems of operating electric devices, namely, the series and the parallel or multiple. In the series system, upon which telegraphic instruments have been largely operated and upon which all the early arc lighting development took place, the current passes successively through every motor mechanism on the circuit, these mechanisms being disposed along it like beads on a necklace, and each device receiving sufficient current to energize it. In arc lighting the circuits extend over large territories, with lamps sparsely scattered here and there, and the series principle is well adapted to it, supplying current at high pressure sufficient to overcome the resistance of the long, thin line wire, and giving each lamp the needed electric motive force and quantity of current. But in street railway work where the device, instead of needing a small quantity of current, requires several horsepower, and where the high voltage would be brought into dangerous proximity to the passengers and vehicles, the difficulty of using the series system would seem insurmountable. For this reason ultimately, if not at first, nearly all inventors whose names have been mentioned constructed their systems to operate upon the parallel or multiple plan, under which the incandescent lamp had already been successfully operated. In the parallel plan the current receiving devices, such as lamps or motors, are not strung along in series but are arranged similarly to the rungs of a ladder, each device being on one step of the ladder, so that as current flows from the generator at a moderately low pressure into the system, represented by the two uprights of the ladder, each step receives only the "divided" current that it needs and for which it has been designed. Applying the kindred analogy of two large water pipes from a reservoir with smaller pipes crossing between them, it will be understood at a glance that from the supply of water circulating in the system, each smaller pipe will allow to flow through it only the quantity of water which its capacity permits it to receive, and no more. It will also be readily understood that any working device, such as a tap or paddle, in any one of the smaller pipes, might easily be cut off or cease to operate, without in any wise interfering with any of the other devices of the same kind in any of the other pipes. Not only is an even greater flexibility of current utilization obtained by this method, but all the current in the system can be set flowing at a predetermined low measure, within the limits of safety. On the other hand, in the series system, in spite of all that might be done to the contrary, the failure of one device to operate would be extremely likely to cut off either the entire system or all the line

on the other side of it. Moreover, every addition to the length of the system and the number of devices put on it would require an increase in the pressure or potentiality, in order that the required amount of current might be delivered to the device farthest away as well as to the one nearest the point of current supply.

Professor Short, however, in those early days, was of the opinion that the greatest economy in electric railway work, as in arc lighting, could be obtained by the use of a constant series current of small amount, and for several years, with great ingenuity and perseverance, he endeavored to work out a system of this kind. Various forms of conduit were used to hold the conductor for current supply under the cars, and great improvement was made in this respect. In the first form, for example, a sliding bar contact was carried under the car which traveled in the conduit, and as this bar passed through split contacts in the conduit the current was led into the car. But the broad series plan was destined to failure, whether in the conduit or in the overhead trolley form, although some of the later methods of conduit construction were suggested by these experiments; and the road soon went out of existence. Professor Short was not discouraged, however, but continued for some time after to experiment with the series system until, at last, the success of the parallel system induced him to devote his energy entirely to that method of operation as well as to efforts to improve other features of the work, such as motor construction and suspension. Professor Short is entitled to the credit of using motors which were series wound, i. e., had the field coils and armature in series, as in present practice, while he was also early in his recognition of the superiority of spur gearing with double reduction of speed for the motors employed.

It is interesting to study the lives of men who have worked along these same lines and to note how near some men have come to success, finally abandoning their efforts altogether, or having their work remain neglected and unknown for years. A typical instance of this kind is that of Mr. George F. Green, of Kalamazoo, Mich., a jobbing machinist, who, as early as 1856, built some small electric motors and a circular track, upon which he operated a small car by connecting a stationary battery to the rails, so that the current would pass from the rails up through the car to the motor and then into the other rail and back to the battery; but, like everybody else, he soon discovered that primary batteries were not good for such work. Although he did not abandon his electric railway ideas, he does not appear to have put them again into execution until 1875, some twenty years later, when he contrived to interest some one in the construction of an electric railway with a track 200 feet long. This attracted a great deal of attention locally, and was described in the Kalamazoo newspapers. This road depended upon batteries for current. It could carry about 100 pounds of freight or

one passenger. The car had a switch or circuit controller, which in one position opened the circuit to stop the car, and in another reversed the circuit, while at the end of the line the switch struck against a stationary finger which reversed it, causing the car to run back again, the reversing lever being operated by hand. Mr. Green stated that it was his intention to use a dynamo instead of the battery to furnish the current, because it was more economical; but for various reasons, such as lack of funds or of urgency, he did not secure it. It was several years before he secured the patent that gave him the desired status. By this time, however (1891), numerous trolley systems had come into operation all over the country, and Mr. Green's patents were superseded. While he would appear to be entitled to considerable credit for his early ingenuity, no trace is discoverable of benefit derived by the art as a whole from any of his suggestions or improvements.

In the same class with Green should perhaps be included Dr. Wellington Adams, of St. Louis, Mo., a man whose name was at one time quite conspicuous in the controversies over the development of the electric railway, and who has at least some claim to the discovery of one or two of the fundamental principles of the art, although litigation did not result in his favor. As early as 1879 Doctor Adams, then connected with the medical college at Denver, Colo., constructed a small model of an electric railway which was used to demonstrate a lecture on electricity delivered at Colorado Springs. From that time on, and during the period of his residence in St. Louis, Doctor Adams was active in the prosecution of his ideas on electric railways, and a lecture of his on the "Evolution of the Electric Railway," in its commercial and scientific aspects, delivered before the Engineers' Club, of St. Louis, as early as 1884, reveals a remarkable grasp of important principles. Discussing the plans which had been tried of mounting an electric motor on a car and connecting it by means of a leather or chain belt, or by a train of cogs, with the car axle, he pointed out that it was desired to dispense as much as possible with intermediate gears and to connect the motor directly with the axle.

Doctor Adams was also an early advocate of the independent car with its motor equipment, seen in the trolley car of to-day as distinguished from the locomotive type, in which one vehicle containing all the motive power hauled a train of unequipped cars or trailers, and he set himself to work to devise a practical method of applying the power on each car. He decided that the armature of the electric motor must run at a high speed and that its power must be transmitted to the wheels of the car by means of a positive gearing. He illustrated his idea by two types. In one type the motor was actually built into each driving wheel, the wheel being formed of two separate electro-magnetic systems, the field and the armature, both capable of revolving. In this way, obviously, all gearing was dis-

pensed with and the driving power was distributed to each wheel and delivered directly at the point of traction. In another type, which was shown in operation and which conforms more nearly to modern practice, Doctor Adams took the field from the structure of the wheel and built it solidly around the axle between the wheels, the armature, as before, being mounted on the axle and inclosed by the field of the motor in such a way that the revolutions of the armature would result directly without any intervening gears in the revolutions of the car axle and wheels. This mechanism was flexibly suspended by springs from the sills of the car, but not otherwise connected with it; and although such a system would naturally constitute a gearless motor, the power in the electric truck shown by Doctor Adams was transmitted through an epicycloidal train of friction gearing at each end of the armature. As all the parts were in line and moved together, the field being rigidly attached to and forming a part of the car axle box, a motor system with little wear and tear or liability to get out of order resulted. Besides this the electric motor suspended from the sill of the car gave protective flexibility against the inequalities of track, sudden breakings, etc.

This early experimental work of Doctor Adams constituted in later years a large share of his claim to recognition, but he also attracted attention by a scheme for a high-speed electric railway, to be constructed between Chicago, Ill., and St. Louis, Mo., for use at the time of the Columbian Exposition in 1893. At that time Doctor Adams advanced several ingenious ideas, and proposed boldly to utilize train speeds and high pressures of current, which are to-day, in 1903, still the subject of investigation. The most notable work along this line is that being done in Germany, where, on the Zossen Military Railroad, near Berlin, the German Government and a syndicate of manufacturers, aided by some of the best technical talent in the Empire, have been experimenting with cars and locomotives, and have actually succeeded in attaining a velocity of over 130 miles an hour, in some cases applying directly to the vehicle and to its motors an alternating current at the unprecedented pressure, for tractive purposes, of 13,500 volts. The difference between this work in Germany, which promises to be fruitful of valuable results, and that of Doctor Adams is that, while apparently large sums of money were raised for the Chicago-St. Louis line, it never materialized so far as the public was concerned, and remains a curious chapter of failure pointing in the right direction.

Without in any way belittling the splendid work done by Van Depoele and the other pioneers whose efforts have been reviewed briefly, it must be admitted that the modern era in street railway work dates as much from the equipment of the street railway system at Richmond, Va., by Frank J. Sprague, as from any other landmark in the history of this industrial development.

Mr. Sprague, who was a lieutenant in the United States Navy, from which the electrical ranks have drawn some of their most notable recruits, turned his attention to electricity while quite young, and was one of the fathers of the modern power motor. Encouraged by the cooperation of Mr. Edward H. Johnson, then at the head of the Edison lighting system, Mr. Sprague was able to perfect his motor, and to introduce it in a large way, for those days, upon the low-tension incandescent lighting circuits of the Edison company scattered throughout the country. Mr. Sprague and his associates, however, not satisfied with this field, extensive as it promised to become, soon turned their eyes in the direction of electric street railways, which, in 1887, were quite short and had but a few cars. A contract was signed for the equipment of the Union Passenger Railway at Richmond, upon which no fewer than 40 cars were to be placed, 30 of which were to be in use at the same time. This contract called for as many electric cars as were then in service in this country, and the grades in Richmond were such as were generally believed to be beyond the climbing capacity of any electric vehicle. There were 29 curves on the road, 5 of them less than 30 feet radius, and the track was a 27-pound rail loosely jointed, laid in Virginia clay, and some of the grades reached 12 per cent. The contract called for the complete equipment of this road in ninety days. After considerable experimental work, with troubles and disasters of every description, the road was opened for regular service about February 1, 1888.

Among the general characteristics of the system was a small overhead trolley wire, with which the under-running trolley made contact reenforced by a main conductor, supplied with current by feeder circuits from the central power house. The track constituted the return circuit, the rails being bonded together and connected with a continuous conductor, which was also connected with ground plates and with the water and gas systems of the city. The working potential of the line was 450 volts and the motors operated on the parallel or multiple arc system. The two motors under each car had single reduction gears—that is, one gear was placed on the axle and the other on the armature shaft, and the motors were flexibly suspended. These motors had also fixed brushes, and were operated by the motorman through rheostatic series parallel controllers, with sectionalized field coils at each end of the car. Very soon the single gears had to be abandoned for double reduction gears, although a reversion to the single reduction gear soon took place. The motor armatures were double ended, having a commutator at each end cross connected, so that but one top brush on each commutator was used. Although most of the motors were built in one of the best electric shops of the country, they were so inadequate for the

heavy work demanded of them that every one of them had to have its field magnets and armatures rewound, and its commutators changed.

At that time it was generally believed that an ordinary 16-foot car could easily be operated by a couple of motors of from $7\frac{1}{2}$ to 10 horsepower each, and even one motor was considered equal to a task which had previously been discharged by a team of mules or horses. It did not take very long for the managers of the new electric roads to learn that while motors of 1 or 2 horsepower might be sufficient to keep the car moving, much greater power was needed to start up the car from a state of rest, especially with a heavy load of passengers, and from that time on the capacity of the motors was increased. A great amount of attention was also given to their insulation—a necessary precaution, as the motors were then run entirely open and exposed to dust, mud, and weather. There was also a great deal of trouble with the brushes on the motors, and before carbon blocks were adopted finally for this purpose brushes built of copper and even of solid bars of bronze were tried. The first flat brushes used on the Sprague motors were solid or of laminated copper, which wore through quickly, bent over, and formed an arc around the commutator. Oblique and tilting forms of brushes were also put in use, but the resultant wear upon the commutators was very great, necessitating endless repairs. Moreover, many difficulties developed in connection with the overhead system, and Mr. Sprague states that probably not less than fifty modifications of trolley wheels and poles were used before what is now known as the "universal movement" type was adopted. The same was true of overhead construction at curves, and at the switches or turn-outs where the trolley wheels had to leave one line of motion and take up another.

In spite of all the difficulties, the Richmond road continued operation and attracted wide attention in the street railway world and in financial circles. At that time the question of equipping the West End Railroad of Boston, one of the largest systems in the country, with cable, was being considered; one of the arguments for its adoption was that with the cable a large number of cars could be kept in motion at once, which, in the opinion of street railway managers, was not yet possible with electricity. The president of the Boston system, with some of his officers, visited the Richmond road, and was shown no fewer than 22 motormen starting up their cars one after the other as rapidly as headway could be obtained. This experiment was conclusive, and settled the fate of the Boston cable project. But successful results were attained only by ceaseless effort and unremitting experiment. In winter the wires would become so coated with sleet that the trolley wheel could not make contact with the incased wire. This trouble has since been met by sleet cutting devices; but at that time it was nothing unusual to put a man on top

of a car with a broom or stick to pound the trolley wire and free it of ice, or even to hold up the trolley wheel in contact, acting as a human trolley pole. Another difficulty was experienced with thunderstorms. At Richmond the long overhead circuit, entirely unprotected by lightning arresters and with numerous ground connections through the motors and lamp circuits, provoked constant discharge. The line was frequently struck, the discharge often passing through the incandescent lamps and shattering the carbon filaments. After a time the engineers learned, as a safety precaution, to turn on the lights during a thunderstorm. During such storms, also, the discharge would sometimes go to ground through the motor fields, burning them out, and sometimes through the controllers. Choke coils to fend off the lightning were soon installed on the cars, and various kinds of lightning arresters were devised, but such discharges long remained a serious impediment to trolley work.

It is, of course, quite beyond the scope and aim of this report to give credit to each inventor for his specific contribution. The intention is simply to give a short continuous record of the stages by which the street railway system has reached its present development. But the separate steps of success and achievement have become associated with the names of certain individuals, and in some instances the decisions of the courts have reenforced or determined the weight of public opinion. This was true in the case of Van Depoele in his perfection of the underrunning trolley, so was it also in the case of Sprague in his contribution to motor suspension. A decision of Chief Justice Shipman in the United States circuit court of appeals in the second circuit is here quoted because it presents succinctly the state of the art and describes Mr. Sprague's service. It is a decision which has been quoted by other judges in litigation on kindred issues. Justice Shipman said:

As soon as the use of an electric motor for the propulsion of cars upon a street railway was thought to be attainable divers methods were invented which were intended to enable the motor to act efficiently, economically, and certainly upon the car axle. At first the motor was supported by or on the car body and afterwards it was upheld upon a separate platform. The state of the art upon the subject is so fully stated by Judge Sanborn in *Adams Electric Railway Company vs. Lindell Railway Company* (77 Fed. Rep., 432, 40 U. S. App., 482) that it need not be restated here. Sprague hung the motor under the car body directly upon the axle of one of the pairs of wheels by an extension or solid bearing attached directly to the motor. He used a magnet having a yoke and pole pieces, and by sleeving one end upon the axle he caused the armature, which was carried between the poles of the magnet, to be held with firmness and the armature shaft to be held in alignment with the car axle. The opposite end of the motor was upheld by springs extending to a crossbar on the truck frame. He also relieved the weight upon the axle by a spring support from the truck of the vehicle. The motor was thus hung below the car, one end being centered upon the axle and the other end being flexibly attached by springs to the truck frame. The effect of the mode of construction is explained in the specification as follows: "The armature being carried rigidly by the field magnet, these two parts must

always maintain precisely the same relative position under every vertical or lateral movement of the wheels or of the car body; and as the field magnet which carries the armature is itself centered by the axle of the wheels to which the armature shaft is geared, the engaging gears also must always maintain precisely the same relative position. At the same time the connection of the entire motor with the truck is through springs, so that its position is not affected by the movements of the truck on its springs." The simplicity and comparative lightness of the general plan upon which this motor was constructed and the adaptability of the means to the required result made the motor successful, and other preexisting methods of construction disappeared to a great extent.

Any history of modern street car development must include the development of elevated railways, which, occupying main lines of thoroughfare, with tracks elevated above the street surface, so as not to interfere with ordinary vehicular traffic, transport a large number of those who travel daily from one part of an urban center to another. Such roads have been peculiarly, though not exclusively, an American development and are restricted in this country to a few of the largest cities, such as New York, Brooklyn, Chicago, Boston, and Kansas City, in most of which they have already become an integral part of the surface street car systems, operating under the same management and providing for exchange of traffic. This subject will be dealt with in another part of the report, but it is proper here to note that some of the earliest work of such men as Daft, Sprague, and Field in the application of electric motors to short haul passenger transportation was done on the elevated roads of New York, where many important lessons were learned. The use of steam on the elevated roads continued for many years without complaint, and the service rendered to the various communities was remarkable for its efficiency, safety, and regularity. But whether from the increased amount of travel, necessitating more frequent trains, or from the inconvenience and discomfort due to dust, ashes, escaping steam and gas, dropping oil, and the like, or from the inability of steam locomotives of the necessary medium size to haul heavier trains at higher speeds over the structures, the fact remains that by 1885 a plan had been formed for equipping sections of the Ninth Avenue and the Second Avenue Elevated railroads in New York city with electricity.

Mr. Daft equipped the Ninth Avenue line from Fourteenth street up to Fifty-third street, a distance of 2 miles including a heavy grade. A third rail was laid between the two traction rails as a conductor to deliver current to the motors, and the outer rails were made the "return." The electric locomotive built to haul the train of cars had driving wheels 48 inches in diameter, and was equipped with a motor of 75 horsepower, having a normal speed of 18 miles per hour and a maximum of 40 miles. The complete motor weighed 9 tons, and was 14 feet 6 inches in length, with a normal width across the standard gauge track of 4 feet $8\frac{1}{2}$ inches. This motor was supported at the rear on a shaft resting

in bearings. Its front end was supported by a long screw which passed through a threaded eye. This screw was turned by a hand wheel. The armature shaft carried a friction wheel 9 inches in diameter, bearing upon a larger friction wheel 3 feet in diameter, geared to the axle of the main driving wheels. Thus, by turning the large screw, the upper friction wheel could be pressed against the lower to any desired degree, and in this manner power was transmitted by friction from the armature to the drivers, the amount of friction being regulated at will according to the load. Mr. Daft thus obviated the necessity of belts and pulleys, sprockets, link belts, etc. By means of the screw, also, the motors could be raised to clear the driving wheels, so that the armature could be taken out and inspected or repaired with convenience. This locomotive was provided with electric brakes, consisting of large electro-magnets, which, being energized by current from the track, were attracted by the wheels, and pressed against them like an ordinary brake. The terminals of the compound winding of the motors were brought to a regulator or controller, convenient to the hand of the motorman in front of the locomotive, and by the motion of a lever across the terminals, the resistance of the field magnets could be altered, producing corresponding changes of speed. The current was picked up from the central third rail by a bronze contact wheel 15 inches in diameter. The motor proved too light for its work, and was afterwards reconstructed. But neither then nor now does it appear that the locomotive principle was found best adapted to street electric traction, however well it may have been adapted to steam traction.

Meantime, Mr. Stephen D. Field, as representative of the Edison-Field interests, began work on the Thirty-fourth street spur track of the Second Avenue Elevated road, introducing an electric locomotive which, outwardly at least, resembled nearly all of the electric locomotives which have later come into actual service. But in the Field locomotive the motor was mounted upon the rear truck, and was connected to the driving wheels in a manner exactly like that employed in the ordinary steam locomotive. In other words, the motor shaft was directly connected with the drivers by means of a crank and side bar. Another of the features of this machine, which was series wound, was that it was regulated by means of a liquid rheostat or resistance placed in the cab. This rheostat consisted of a trough divided into two compartments filled with acidulated water. A metal plate on either side of these troughs acted as a terminal for the feeding circuit which was led in by two copper cables. The speed of the motors was regulated by the insertion or withdrawal from the troughs of two slabs of slate suspended over the troughs and operated by a long lever, thus varying the resistance from almost nothing up to any desired degree. Mr. Field had other ingenious devices for reversing, for shifting the brushes

to prevent sparking at the commutator, etc. This locomotive had a total weight of over 13 tons, and hauled a passenger car which was regularly hauled by a 13-ton steam locomotive. It also handled easily one of the regular large elevated coaches up grade at 8 miles an hour, and was often operated under a potentiality as high as 1,100 volts.

In contrast to Daft and Field, Sprague advocated the abolition of the locomotive and the installation of one or more motors under each car. His arguments appear to have been final and conclusive. The locomotives have disappeared and motor cars have taken their place. Mr. Sprague made his experiments on the Thirty-fourth street branch of the Third Avenue Elevated, placing two motors on the car trucks. The motors being thus grouped in parallel on a constant potential circuit, and driving from opposite ends of the motor shaft, a very intense rotary effort or torque was secured in starting, by having an intense magnetic field and raising the armature potentiality gradually. A system of braking was tried which consisted in converting the energy of the train into current, delivered back to the line from the motor, which thus temporarily became a dynamo without reversal of contacts. The current was taken up from a central rail by three contact conductors, two of which were bronze wheels working on pivoted arms under compression springs. Special switches were provided for handling the motors, breaking the main circuit, reversing the armature circuit, cutting the armature partially from the line, and closing it upon a local regulating apparatus. A potentiality of about 550 volts was used, current being obtained from 5 Edison incandescent lighting dynamos placed in series, the circuit being led on Western Union telegraph poles to the track from a power plant almost a mile away. A number of other interesting features were included in these experiments, but evidently the time was not ripe for the change in New York. It was not until fifteen years later that electricity was finally adopted as the motive power of the New York elevated system, although meanwhile it had been adopted with success on the elevated systems of Chicago, Brooklyn, and Boston. The demonstration made at the World's Fair in Chicago in 1893 was sufficient warrant for resorting to electricity on those roads. An elevated structure known as the Intramural Railway made an almost complete circuit of the grounds, being nearly 3 miles in length, comprising 14,800 feet of double track and 1,900 feet of single track. Over this road were run 15 trains, each consisting of 3 open trail cars and a motor car. Each car was mounted on double trucks and was 50 feet in length. The trailers when loaded weighed 22 tons and the motor car 30 tons. Each motor car was equipped with 4 motors—one on each axle. The motors were single reduction, so geared as to work at a maximum speed of 35 miles an hour, and were capable of an output of about 135 horsepower, thus giving each motor car something over 500 horse-

power. The current was picked up from the track by means of a third rail placed outside the traction rails, with a sliding contact on the motor car. Current was furnished from a special power plant, with a generator of 2,000 horsepower, a capacity theretofore unknown in connection with street railway operation. This road remained in operation throughout the fair, and is reported to have carried with success and safety no fewer than 125,000 persons in a single day. After this no question remained as to the practicability of operating extensive elevated lines with electricity.

The record of experiments would not be complete without a reference to storage batteries, which at first gave great promise, but which, from various causes, have since been almost entirely abandoned. All of the earlier experimental work with electric traction depended upon primary batteries as a source of current. The vehicle in some of the larger types, as, for example, that of Professor Page, at Washington, carried its own battery and was thus self-contained. There are so many obvious advantages in a self-contained vehicle that no wonder need be entertained at the persistence with which these earlier attempts were renewed, when the storage battery came to the aid of experimenters. A battery car does not require a cumbrous system of overhead wires more or less disfiguring to the street, nor does it require a third rail, or a complicated system of conduit construction as in the case of cars with underground contacts reached through a slot in the track. Neither do such cars require an elaborate system of mains and feeders for bringing the current to the track from the power house, nor for effecting the return circuit. Moreover, in case the power house is for any reason temporarily thrown out of service, each car with its storage battery is equipped with enough current to maintain its schedule, whereas with trolley or conduit cars all the cars out on the road are instantly stopped the moment the current is cut off, and are compelled to stand still until the current can be thrown on again.

These and other considerations led to interesting experimental work as early as 1880 and 1883, both abroad and in this country. Storage battery cars were put in service in New York city, Philadelphia, Washington, and elsewhere. The most ambitious work of this character was done in New York city in 1887 and 1888 with the system of Mr. E. Julien, of Belgium, as a result of which 10 or 12 cars were in operation for a considerable time on the Fourth Avenue road. The ideas of Mr. Julien were considerably modified by Mr. C. O. Mailloux and excellent results were obtained, while other encouraging experiments were made in Philadelphia under the direction of Mr. Anthony Reckenzaun, of Vienna. Simple as the storage battery idea is in conception, it proved to have a great many difficulties in its application. Some of these arose in connection with the early types of storage batteries, which were found quite inadequate to withstand the strain of street

railway work. Batteries broke down very rapidly under the heavy discharge of current necessary at intervals and proved liable to short circuit from jolts and concussion on the tracks. The weight of the batteries also proved a considerable drawback, the cells first used weighing not less than 100 to 125 pounds per horsepower hour of energy stored, which limited the radius of the car very seriously. Lighter cells giving an output of 1 horsepower per hour with 50 to 75 pounds of battery were found to be too fragile for such work. Another difficulty which proved insurmountable was the annoyance to passengers from sulphuric acid gas escaping from the cells. Moreover, the acid scattered by the jolting of the car corroded and weak-

ened its structural material. Another difficulty arose in the handling of the relays of batteries at the power plant, and various ingenious devices and contrivances were employed by which the exhausted batteries, when they came in, could be quickly exchanged for batteries freshly charged. To obviate the necessity of any such mechanism the batteries were sometimes left on the cars all the time, but this, of course, necessitated the doubling of the rolling stock. For several years experiments with the storage battery continued with varying success. But although a few such cars were in operation as late as 1902, as shown by the statistics, the last of those in New York city were withdrawn from the streets in 1903 while this report was in press.

CHAPTER II.

ROADBED, TRACK, AND ELECTRIC CONSTRUCTION.

I.

ROADBED AND TRACK.

With regard to the statistics of track and roadbed it may be pointed out that at the census of 1890 the railways that used motive power other than steam were confined almost exclusively to urban districts, and were properly classed as "street railways," but since then the application of electricity has enabled these roads to extend their lines greatly in rural districts, and a considerable proportion of the trackage is now outside the limits of cities, towns, or villages. That the use of electric power has been the principal factor in the development of these railways during the past twelve years is shown by Table 4, page 8, which presents for the years 1902 and 1890, the number of miles of single track in the United States, classified according to the motive power used.

The increase in the length of track is confined entirely to the railways operated by electricity. The mileage operated by this power increased from 1,261.97 miles in 1890 to 21,901.53 miles in 1902, while a decided decrease is shown in the trackage for each of the other classes of power. Single track roads are characteristic of rural districts, and the fact that the percentage of increase in length of line is greater than in length of track is due principally to the great development of interurban single track lines since 1890. In some cities, as, for instance, in Philadelphia, owing to the narrowness of the streets, the railways are sometimes single track, going out on one thoroughfare and returning on an adjacent one.

Track statistics.—The 22,589.47 miles of track reported for 1902 consisted of 16,651.58 miles of first main track, 5,030.36 miles of second main track, and 907.53 miles of sidings and turn-outs. The further segregation of this trackage according to power used, ownership, and location for the United States and for each state and company is shown in Table 94. Table 86 presents the totals for the United States, and shows the mileage of each of the different classes of track and the percentage which each class is of the total.

TABLE 86.—Single track mileage and percentage each class is of total: 1902.

CLASS OF TRACK.	Single track mileage.	Percentage of total.
Total	22,589.47	100.0
First main track	16,651.58	73.7
Second main track	5,030.36	22.3
Sidings and turn-outs	907.53	4.0
Overhead trolley	21,302.57	94.3
Other electric power	611.44	2.7
Compressed air	6.06	(²)
Animal	259.10	1.1
Cable	240.69	1.1
Steam	169.61	0.8
Trackage owned	19,038.33	84.3
Trackage leased	3,551.14	15.7
Operated under trackage rights	560.92	2.5
Constructed and opened for operation during the year ..	1,549.73	6.9
On private right of way owned by company	3,424.96	15.2
On private right of way not owned by company	377.11	1.7
Located within city limits	13,208.24	58.5
Located outside city limits	9,381.23	41.5
Equipped with cast welded joints	1,642.68	7.3

¹ Includes 12.48 miles of track duplicated in reports of different companies.

² Less than one-tenth of 1 per cent.

³ Exclusive of the mileage of Massachusetts.

Of the total mileage, 21,914.01 miles, or 97 per cent, were operated by electric power, and 416.36 miles, or 1.9 per cent, by other mechanical traction, while only 259.10 miles, or 1.1 per cent, were operated by animal power, as compared with 69.7 per cent in 1890. Even this heavy preponderance of electric traction has been increased during the preparation of the present report.

Of the total trackage in use by all companies, 84.3 per cent was owned by the operating companies and 15.7 per cent was operated under lease. The mileage of track constructed and opened for operation during the year covered by this report was 1,549.73 miles, or 6.9 per cent of the total; but this does not cover all of the track under construction. A number of miles of electric track were in various stages of completion, but it was impracticable to fix upon any stage of the work at which the trackage could be enumerated other than that of actual completion.

The statistics concerning track located on private right of way refer particularly to rural electric railways. Many of these, after the manner of steam railways, have bought or have had surrendered to them a separate roadbed, either adjoining or independent of

the highway. It appears from the reports that 3,424.96 miles of single track were on private right of way owned by the company. Occasionally the railway is built on a private right of way not owned by the company, an example of which would be a toll bridge owned by a bridge company, to whom payment for the privilege of using it was made. There were 377.11 miles of track on right of way of this character. Many of the new interurban electric roads run right across the country, making little use of highways, to which street railways have previously clung so tenaciously.

The inquiries concerning the location of track—whether within or without city limits, were made with the intention of ascertaining the relative length of track operated in urban and rural districts, respectively. In a number of cases it was impossible to determine exactly the trackage that should be assigned to these two subdivisions. In some instances the track was within, or passed through, thickly settled communities that were not organized as cities or towns, and therefore had no corporate limits, and it was difficult to obtain the length that should be considered as within the urban district. In the New England states densely populated communities are often legally part of the town government, which also includes rural districts. Many companies in Massachusetts reported that it was impracticable to make the distinction, and accordingly the trackage for that state has not been included in this classification. For the United States, exclusive of Massachusetts, 13,208.24 miles of trackage, or 65.8 per cent of the total, were reported as within urban limits and 6,855.58 miles, or 34.2 per cent, as outside of such limits.

The increase in the trackage is due not only to the building of new lines, but largely to the extension of the lines of established companies. This is illustrated by Table 80, in which the operating companies reporting in 1902 and 1890 are grouped according to length of line operated.

The average length of line per operating company for all companies was 20.38 miles in 1902, as compared with 7.41 miles in 1890. Thus the average operating company in 1902 controlled almost three times the length of line that was controlled by the average company in 1890. In 1890, of the companies reporting, only 8 operated more than 50 miles of line, while in 1902 the number of such companies had increased to 69. Of the total number of companies reported for 1890, 94.9 per cent operated less than 20 miles of line each, and their combined length of line amounted to 71.5 per cent of the total in the United States; in 1902 corresponding percentages were 75 and 30.7, respectively. Thus, while there are still a large number of companies that operate less than 20 miles of line, the proportion of the total length of line operated by them is not half so great as in 1890.

Roadbed construction.—It is needless to say that one

of the most important features of a street railway is its track, and this importance may be brought out more emphatically by regarding the matter from different points of view. A good track is necessary to the smooth and economical operation of cars; it is of importance as bearing on the comfort of the passengers, and the track in its relation to the roadbed and to the thoroughfare through which it runs must be considered from its effect on the convenience of foot passengers and the durability of vehicles using the road.

Of the roadbed it may suffice to say that it is good practice to have a good ballast—for instance, clean, broken stone and sharp, clean gravel or furnace slag—at least a foot deep under the ties, with the space between the ties filled up evenly to the top, with proper provision for drainage connection with the sewers. In exposed track coarse, large stones placed edgewise at the bottom of the ballast are common, in order to provide for draining or sewerage; filling in the interspaces with the gravel or other ballast, thoroughly rolled or tamped down; and upon this bed are placed the ties which carry the rails. It has sometimes been the practice to set the rails or track construction upon a bed of concrete, or upon long concrete beams or stringers under the rails. In Buffalo the concrete bed has been laid entirely across the track, while in Kansas City, St. Louis, Philadelphia, and other cities the stringer construction is used.

The difficulty which has to be considered in connection with the use of concrete for this purpose has been that of track renewal, since, where the rail lies in concrete or where there are steel ties or cross girders thus embedded, the entire concrete portion must be renewed when the rails wear out and new rails are substituted. Some of the most extensive construction within the last few years in Chicago and New York city has been with wooden ties on a broken stone ballast. Thus it might almost be said that as a general thing recent work has developed the somewhat anomalous condition of using the more substantial concrete construction on the smaller roads where traffic is not heavy, and the lighter, more elastic wooden construction on roads with dense and ponderous traffic.

In this connection it may be interesting to note the practice of the Rochester Railway Company, Rochester, N. Y., as reported by the chief engineer, Mr. Le Grand Brown. In addition to track constructed by the ordinary method this company laid considerable concrete beam and steel tie construction. For ties the company used old 4½-inch girder rails cut into 1½-foot lengths, which were inverted and fastened with bolts and clips to the main rail. These steel ties were bedded in concrete, and under the rails were placed concrete beams 12 inches in depth and 14 inches in width. Where the ties were located, a trench 4½ inches below the tie and about 12 inches in width was filled with concrete. The remainder of the pavement between and beside the rails

was a 6-inch concrete base, while under the whole was a 4-inch layer of stone chips. Drain tile was laid parallel with the track and connected with the sewers. The pavement was laid upon a cushion of sand 1 inch in depth; and where the street pavement was of brick or asphalt, the concrete was carried slightly above the base of the rail. From 1897 onward this construction was carried out with 6, 7, and 9 inch rails in asphalt, brick, and Medina stone pavements. The track was raised and blocked to grade and line before concreting, little trouble being experienced in keeping it in place during the work, and care was taken to have the concrete well tamped under the base of the rails and around the ties.

With regard to the rail itself there is considerable difference in the practice of street railway companies, to which allusion will be made later. So far as known the first street rail laid was that on Fourth avenue in New York city. This was of the flat type, being nothing more than a single bar of iron with a groove formed in the upper surface, into which fitted the flange of the revolving wheel. This type of rail, with a weight ranging from 30 to 80 pounds per yard, although modified in many respects, was adhered to for a long time. Such a rail was more particularly adapted to light traffic, but even then was found to need vertical stiffening and longitudinal support. In America a small lip or flange was added to the underside to prevent the rail from slipping off the stringer, while in England a second flange was added, and the web was increased in depth. This feature reached such a development in some cases that the rails had a total depth of 2½ inches; the longitudinal stringers were abandoned, the rail being supported on cast iron chairs placed at intervals of 3 feet. As most of these rails, however, were used with wooden stringers, fastenings were used, consisting usually of spikes, staples, or lag screws passing through the rails. The rails were joined at the ends by rail joints, which were at first plain flat bars of iron, 3 or 4 inches wide and 8 or 10 inches long, let into the stringers and giving but a weak support to the loose rail ends. The next step from this flat or tram rail was to the T or Vignole rail, identical in most respects with the rail now used exclusively on the steam railways of the United States.

As will be noted from the returns in this report, the T rail has found extensive use among the street and interurban railways, though it is obvious that the conditions on street railways differ materially from those on steam railways. The main considerations which have led to its adoption or use, as compared with the girder rails, are that it is without the tram and groove of girder rails; it does not invite street traffic; it is generally easier to lay; it is cheaper, the price per ton being less than for the girder rails; and, finally, owing to its symmetrical section, a lighter rail can be used under similar conditions than would be the case if the girder type was resorted to. These remarks apply

more particularly to roads in cities and their suburbs, since on the interurban railroads, which will be discussed separately, the T rail, with an average weight of 70 pounds, is almost universally used.

Track construction on selected railways.—Perhaps the best way to summarize present methods of track construction in standard American practice, as embodied in this report, will be to consider the practice prevailing in some of the leading cities and street railway systems of the country.

The United Railways and Electric Company of Baltimore uses for construction in paved streets 9-inch grooved rails, laid on Georgia pine ties, 6 inches by 8 inches by 8 feet, spaced 2 feet between centers, the ties being tamped up with 3 inches of gravel and no other ballast or concrete being used. The standard distance between track centers is 10 feet, although this is reduced when necessary in narrow streets. The rails are in 60-foot lengths, and are laid with broken or alternating joints. No tie plates are used, but tie rods are placed every 6 feet. Angle bar joints have been used recently, which on girder and grooved rails are 22 inches long, with 8 bolts, and all are between ties. The company also has some exposed 60-pound T rail, spiked to hewn chestnut ties 6 inches thick, with a face of from 6 to 12 inches, 8 feet long, placed 2 feet between centers. The ballast, 4 inches deep, is filled in between the ties to the base of the rail, sloping off to the roadbed 18 inches outside of the ends of the ties. The rails are 30 feet long and are laid with broken joints and no tie plates. The standard bond to secure electrical continuity between the abutting sections of rail is a tinned No. 0 copper bond wire, fastened to the rail with channel pins, though some of the heavy bonding is done with No. 0000 wire, while the standard bonding on exposed T rail on suburban lines is No. 0 tinned copper wire, fastened with channel pins.

The rail used in paved streets by the Boston Elevated Railway Company is in the nature of a compromise between a girder and a grooved rail. It has a groove with a lip one-half inch lower than the head of the rail, and is of a form which will not retain dirt, but offers considerable inducement to vehicles. For track construction where the entire street is laid on a concrete base, the ties, which are 6 inches by 8 inches by 6½ feet, are bedded for their entire length in concrete, which is carried down to the bottom of the ties and thoroughly tamped under the base of the rail. Where the pavement is not laid on concrete, the ties are bedded and tamped in gravel, which is brought up to the top of the ties, granite blocks being used for paving between the rails. On reservations, and where tracks are filled in with loam within 8 inches of the top of the rail, the ties are placed 2 feet 6 inches between centers.

Tie plates are omitted where the paving is brick or asphalt on a concrete base; but where the paving is granite, a cast iron tie plate about 1½ inches in thick-

ness is used, so that the height to the top of the rail is about 10 inches. The track construction is securely bonded to the rest of the street by the fact that the tie is bedded in the concrete. The joints are angle bar, with 12 bolts. The form of construction used in outlying streets, where a reservation has been made alongside the roadway so that there is no paving, is to lay a 7-inch T rail mounted on a 1-inch tie plate. The object of so deep a T rail is to secure 8 inches of loam over the ties for raising grass. Most of the recent bonding has been with protected rail bonds.

In Buffalo the company lays a 94-pound girder rail in paved streets, with a rather narrow groove, whose lip is five-eighths of an inch below the head of the rail. Two forms of track construction are employed, both of which depend mainly on concrete to support the rails. Where granite block paving is permitted for the full width of double track, the track is supported on a solid bed of concrete extending about 8 inches below the base of the rail, and is held to gauge and partially supported by the ties placed every 5 feet. Every alternate tie is of metal, the others being of wood. In places where asphalt paving is laid in the "devil strip" the concrete beam form of construction is employed. A wedge-shaped beam of concrete, 18 inches wide at the top and 8 inches deep, is laid under each rail, ties are placed every 5 feet, and concrete is tamped under every other tie at the time the concrete stringers are laid. The remaining ties support the track during construction while the concrete is being laid, and are laid on tamped stone, the paving between the rails being supported in this case simply on a sand foundation, except where it is above the ties. For suburban or outlying streets a 9-inch girder rail has been extensively employed for paved streets, but in macadam and dirt roads a 6-inch T rail, weighing 72 pounds per yard, is used, and if the track is exposed A. S. C. E. standard T rail is laid. The spacing of ties, which are white oak 6 inches by 9 inches by 8 feet, on suburban work is 2 feet between centers, and they are laid on broken stone ballast 8 inches deep. There are no tie plates, but rail braces are used on the outside of each rail and on curves.

Bonding is unnecessary on the electrically welded track used in Buffalo, which has over 100 miles of such track, as the conductivity of the joint is high and the percentage of breakages is low. On suburban work, rail bonds of the protected type applied with a screw compressor are used. As the introduction of a successful electrically welded track practically assures to a rail a length of life limited only by the wear of the head, some calculations have been made at Buffalo as to the probable wear of rails. On some track which ordinarily has cars on two-minute headway but which, during the Pan-American Exposition had cars on a thirty-second headway, the wear was found to be one-eighth inch in four years. The welding process, as carried on at Buffalo,

begun in 1899, was notable as being the first application on a large scale of a successful method of welding rail joints electrically. The joint plates are welded to the web of the rail by means of bosses on the plates, which limit the area of the welding to the area of the bosses, and so insure a high temperature at the point of welding, one boss being directly at the joint between the rails, another at each end of the joint plate. The center bosses are welded first and those at the ends afterward. In the welding five work cars are employed. One of these is the welding car proper, which carries the welding clamps and the welding transformers. The second car carries a rotary converter, which receives direct current from the trolley wires and supplies alternating current to the welding transformer. The third car has a motor driven booster for raising the trolley voltage whenever the drop is so great that there is danger that the weld may not be successful. The fourth is a sand blast car, which cleans the rails before welding. The fifth carries a motor with emery wheels for grinding off any inequalities in the joint after it is completed. The number of breakages in the electrically welded track in Buffalo has been a very small fraction of 1 per cent.

The Chicago City Railway Company on the last track that it laid employed a 9-inch girder rail weighing 95 pounds to the yard, with wide tread for vehicle wheels, laid on white oak ties 6 inches by 6 inches by 8 feet, resting on sand, the track being held to gauge by malleable cast-iron tie plates with braces. No tie rods were used, and the joints were cast welded. As to bonding, a good cast welded joint was used, and a copper supplementary wire was also run, as required by a city ordinance. It has been approximately estimated that a piece of girder rail track of this company was worn out after the passage of 3,000,000 cars; that is, the head was so worn that the car wheel flanges touched the tread of the rail. The wheel flanges used on this road are unusually shallow, being but five-eighths of an inch.

The rail now used by the Cleveland Electric Railway Company is similar to that used in Boston, except in streets like the boulevards, where the tracks run along grass plats. The track is laid on ties that are placed 2 feet between centers except that three are placed under each joint, these being staggered. Three inches of concrete is placed under the ties. Two kinds of joints have been used—the cast welded and the twelve bolt 36-inch angle bar. On a boulevard line recently constructed 80-pound A. S. C. E. standard rails in 30-foot lengths were used, the bonds used being single or double No. 0000 protected leaf bonds, 10 or 12 inches long, placed under the fish plates. Some 90-pound girder rails which have cast welded joints have been used nine years under a three-minute service.

The Denver City Tramway Company was one of the first to employ successfully the T rail in paved streets

where the traffic is heavy, and was the first to use what is commonly known as the Shanghai or high T rail. Its standard rail for "downtown" service is a 72-pound 6-inch rail, in 60 or 62 foot lengths, laid on Texas heart pine ties, 6 inches by 8 inches by 6 feet, 21 inches from center to center, in gravel ballast, which surrounds the ties and extends 8 inches below them, except in paved streets, where concrete is used between the ties. During the last four or five years the plan has been adopted of treating all rails with one or more coats of asphaltic paint, which has retarded corrosion and electrolysis, as the local soil is impregnated with alkali and mineral salts. For outlying unpaved streets, standard A. S. C. E. 65-pound T rail, in 60-foot lengths, is used. The rails are butted tightly together, and are always laid in cool weather, since they last longer when little longitudinal expansion is allowed. As to the life of ties, it is reported that in Denver, good Texas heart pine ties last from seven to twelve years; white oak ties have been in use for fifteen years and are still good; red and black oak ties are good for from six to eight years; and native pine and spruce will last from four to seven years.

The Detroit United Railway Company lays narrow grooved rails in paved streets, the last laid being 90-pound rails. Some of the first experiments in the United States with tracks supported by concrete stringers instead of ties were made in Detroit. The first construction of this kind was laid on concrete stringers only 6 inches thick, but as these were not strong enough to support the rail, the present construction uses concrete stringers 12 inches thick by 18 inches wide. The concrete stringer is brought up around the web of the rail high enough to permit brick paving to be laid with only a thin cushion between the paving bricks and the concrete. The upper part of the stringer is continuous with the concrete foundation of the asphalt or brick paving, and no trouble is now experienced from lack of sufficient support. For holding the track to gauge, a wooden tie is now placed every 30 inches, whereas formerly a metal tie was placed every 10 feet. The present construction, therefore, with its closely spaced ties, is regarded as a partial abandonment of the plan of depending entirely on concrete stringers for track construction.

The Indianapolis Traction and Terminal Company has two standards of track construction in paved streets, one employing 93-pound girder rails for streets where only city cars will pass, the other a special 91-pound rail, which is a high T rail with a wide head, designed to be easily paved to and yet permit the passage of interurban cars with deep wheel flanges, of which there are now a large number entering Indianapolis over the city tracks. The standard rail for this service is 7 inches high, and has a head 2½ inches wide to reduce the amount of overhang of the wide tread interurban car wheels. For outlying unpaved streets 70-pound A. S. C. E. standard 5-foot rail is laid. The standard tie is 6 inches by 8

inches by 7 feet white oak, laid 2 feet 2 inches between centers and ballasted with gravel concrete, which extends 6 inches under the tie, surrounds it, and is brought to within 4½ inches of the top of the rail. Some track has also been laid on ties spaced 10 feet between centers, with a concrete beam, 20 inches wide and 9 inches deep, under the rail, and extending to within 5½ inches of the top of the rail. The standard bonds are the protected, 10 inches long, placed under the fish plates, and No. 0000, 28-inch wire cable bond, placed over the fish plates. The bonds are applied with a screw compressor. The track is cross bonded every 500 feet between the rails of one track, while at every 1,000 feet there is a cross bond connecting the four rails of the double track.

The Milwaukee Electric Railway and Light Company succeeded some time ago in securing the approval by the city authorities of T rail construction for paved streets. A special new design of T rail, which is 7 inches high, with a head no less than 3 inches in width, has been adopted as the standard, so that, in the future, interurban cars using the city tracks may be equipped with wheels having treads and flanges more nearly approaching the standard steam railroad wheel tread. With a rail having the head 3 inches wide, a car wheel with a tread 3½ inches wide could be used without having the wheel seriously overhanging the rail and bearing on the pavement. In asphalt or brick pavement, track is laid on ties 6 inches by 8 inches by 6½ feet, placed every 2 feet with 6 inches of concrete tamped under each. As this rail has a very broad base, tie rods, which are liable to cause a weak spot in the paving, are not needed. The joints, rectangular in form, are cast welded. In asphalt streets, granite toothing blocks are laid alongside of each rail, for while the city pays for the original laying of the pavement, the company pays for the maintenance of the pavement between its tracks and 12 inches outside its tracks. Granite toothing blocks extend out 12 inches, or to the limit of the distance that the company must maintain paving. On unpaved suburban roads 75-pound A. S. C. E. standard T rail is laid.

The Twin City Rapid Transit Company, of Minneapolis and St. Paul, was one of the first to lay a T rail in streets paved with asphalt, where girder rail had been the rule before. The rail used is 8-inch T, weighing 79 pounds to the yard. The base of the rail rests directly on a concrete beam 22 to 24 inches wide and 12 inches thick under the rail. Around and above the base of the rail is placed 3 inches of natural cement if the paving is of brick, and less if the paving is of granite. A cast welded joint of somewhat unusual shape, 16 inches long and weighing 190 pounds, extends out from the head of the rail so as to make a substitute for paving at that point. A flange way on the inner side of the joint gives the effect of a grooved rail at the joint. The object is to facilitate paving around the

joint and to provide against a weak point in the paving. The rails are in 60-foot lengths. The spaces between and around the paving blocks are filled with Portland cement grout, and fourteen days are allowed for the concrete to set thoroughly before any traffic is permitted. In less substantially paved streets, ties 6 inches by 8 inches by 8 feet, spaced 2 feet between centers, are used. A 6-inch concrete base of natural cement is placed between the ties and around their ends, and on this a sand cushion is spread. The brick or stone paving is set and grouted with Portland cement. For suburban construction a 5-inch 80-pound A. S. C. E. standard T rail is used, with ties 6 inches by 8 inches by 8 feet, spaced 2½ feet between centers.

The Philadelphia Rapid Transit Company uses for its standard track construction in streets having heavy traffic a grooved rail which weighs no less than 137 pounds to the yard, but where the traffic is lighter a section weighing 93 pounds is found sufficient. The latter style is also in use for suburban service where the streets are paved, while for unpaved suburban streets A. S. C. E. standard 90-pound T rail is used. In paved streets track is now being laid on concrete stringer construction, with chairs spaced 5 feet apart and a steel tie used in connection at every second chair, or every 10 feet, provision being made on these chairs for the adjustment of the gauge. A concrete stringer 17 inches wide extends 15 inches under the base of the rail. The foundation of the paving between the tracks is a bed of concrete 6 inches thick. All rails are laid with broken joints. A zinc joint used by the company consists of rolled steel joint plates surrounding the rail web and base, between which and the rail a filling of zinc is poured. Track construction hitherto has been laid on ties 5 inches by 9 inches by 8 feet, spaced 2 feet between centers. Where zinc joints are used no bonds are necessary, but on other track a protected form of bond, about No. 0000 wire, is used.

The Pittsburgh Railways Company uses a 90-pound girder rail, in 60-foot lengths, laid on ties, resting on a foundation of broken stone. This foundation is in two layers, the upper layer being in 12-inch and the lower layer in 3-inch cubes, and extends to a depth of 21 inches below the top of the rail. Ties are 6 inches by 8 inches by 8 feet. Concrete is used around the rails to fill in the space between the head and base, the rails being laid directly on the ties and tie rods used. Cast welded rail joints are now being laid, the ties spaced 2 feet between centers. For suburban service 80-pound T rail and 78-pound girder section have been used.

The standard rail of the United Railroads of San Francisco for basalt block pavement is a 109-pound 9-inch girder, with ties placed 4 feet between centers. For streets paved with bitumen on a concrete foundation a 7-inch girder rail weighing 100 pounds to the yard is used, though for suburban service a 70-pound rail is the standard. The track is laid on ties 6 inches by 8

inches by 8 feet, with 3 inches of ballast under the ties except where concrete is used, when 4 inches of ballast is required.

The St. Louis Transit Company uses a concrete beam under each rail, with a concrete stringer 8 by 18 inches. To hold the track to gauge, a tie rod is placed every 6 feet, clamped to the base of the rails to prevent all tilting. The foundation of the pavement, the bottom of which is flush with the base of the rail, is a bed of concrete 6 inches thick, on top of which the asphalt is placed. The standard rail for city use is a 9-inch grooved rail, either 100 or 98½ pound section, while for suburban service the company uses a 95-pound 9-inch girder rail, and in dirt streets ties are laid to support the track.

Bonding.—It will have been noticed that frequent reference has been made to the subject of "bonds," which constitute so important a part of the system and circuit structure in electric railway work that it would be improper to pass them over without some explanatory comment. It is well understood that the current delivered to a trolley system reaches the car motor by means of feeder and contact wires, and that the circuit back to the power house is completed through the wheels and the track itself. If there were no such circuit completion, current would not flow, and it is therefore an essential and fundamental condition that both the feeding circuit and the return circuit should be maintained intact at all times with the least possible resistance to the flow of the current and also with the least opportunity for the current to leak away. The danger of leakage is particularly great, since the rails generally lie in earth, liable at all times to be more or less damp, and being adjacent to great masses of metal in the shape of gas pipes or water pipes, etc., which would furnish a better path than the rails for the current. Such pipes are liable to be attacked by a disease known as "electrolysis," which means, in this case, the corrosion or eating away of the iron or lead by the current.

It will be seen that with the traction rails broken at joints every 30 or 60 feet, some auxiliary device is necessary in order to make them continuous as a circuit. As even the most exact butting or overlapping of joints was found to develop abnormal electrical resistance, this condition was dealt with in the early stages of the art, and the problem was attacked in various ways. At the time of the street railway census of 1890 one method in vogue was to use the rails of the track exclusively, riveting to the rails around each joint a No. 6 galvanized iron bond. Another method was that of laying an auxiliary copper wire of the same size as the overhead trolley wire down the center of the track, on top of the cross ties, and connecting it with a wire of small size riveted to the center of each rail. As to the first method, it was soon found that galvanized iron bonds disappeared under the exposure to action in the earth, and the rails were rebonded with copper bonds riveted to each rail.

It was then discovered that these bonds were too small and that there was considerable loss of potential power because they deteriorated and broke off, so that it was again necessary to go over the lines and rebond them with heavier material. In the same way, owing to improvements in the method of bonding at the joints and the rapid adoption of heavier rails giving more conductivity in the return circuit, it was found unnecessary to incur the initial expense of auxiliary copper ground wire, and so the use of this was also given up. From that time on there has been a remarkable improvement in the matter of bonding the tracks, and a large variety of bonds have been put into service, usually of solid or stranded copper, but including some of a plastic nature. Among those favorably known and largely in use is the protected type, in which the copper bond, owing to its liability to be stolen, particularly on suburban roads, is protected or concealed and goes in the space back of the fish plate, against the web of the rail. The rails themselves, if their connection was unbroken, could, of course, carry the current of the return circuit without trouble, but as there are from 176 to 352 joints in a mile of track, at any one of which the circuit is liable to break, it is evident that bonds can hardly be used too liberally, while there is even warrant for supplementing the return system with return feeders, which may be carried either underground or on the poles supporting the overhead wires. Some railways have supplemented their track return by inserting into the return circuit a quantity of their old rails which have been scrapped and which can thus be utilized again to advantage. By methods of this kind the street railway companies have not only done much to lessen the annoying disturbance of adjacent telephone circuits experienced in the early days of the trolley, but have obviated quite successfully the electrolytic action on iron and lead pipes in the ground, caused by the current escaping from inadequate return circuits. No small amount of litigation and some very extensive and costly experiments have attended this work and development. The extent to which current can leak from a track may be inferred from the estimate that in ordinary double track the surface exposed for leakage is sometimes as great as 50,000 square feet per mile of route.

Despite the many bonding devices, a good many engineers give their preference to a track which is practically jointless. To secure this result two principal methods have been in use. One of them is electrical, and consists in welding the rail joints and plates together in some such method as that described on page 175 in connection with the track of the Buffalo street railway system. Another method often used consists in casting a sleeve of iron around the ends of the rail joints at the side and bottom. The sleeve is made of cast iron, of special chemical composition, which has been "run" at a much higher heat than is employed in making ordinary castings. The metal is poured in from

one side and comes in contact with the web of the rail at its greatest heat. It brings the thin part of the rail to a white heat and tremendous pressure is exerted on the molten cast iron, which is squeezed into the interstices of the steel rail, becoming such an integral part of it that if a joint of this kind is sawn through it is impossible to say where the web of the rail ends and the cast joint begins. These joints are usually about 14 inches long and weigh from 70 to 140 pounds per joint, depending upon the size and weight of the rail that is welded. A very good mechanical joint is thus effected, and the electrical continuity of the circuit is high. A third method which has recently come into vogue consists in using a welding mixture known as "thermit," which is made of powdered aluminum and iron oxide. The combination of aluminum with oxygen evolves an immense amount of heat, and this reaction has recently been brought under control. A welding portion of the mixture is poured into a small crucible at the joint with a thimbleful of ignition mixture added, and the whole is ignited. The reaction is immediate, and the molten thermit flowing into the mold around the rail makes the joint.

It may be here noted relative to the details given of track bonding, that according to the statistics in Table 94, 1,642.68 miles have been constructed with cast welded joints. This method constituted only a small proportion of the entire mileage, leaving practically all the rest of the track rendered conducting and continuous by means of electrically welded joints or by the very generally used copper rail bonds. The cast welded track is found in a number of states, but particularly in California, with 110.62 miles; Illinois, with 292.68 miles; Minnesota, with 89.57 miles; Missouri, with 376.07 miles, practically all in St. Louis; New York, with 222.82 miles, virtually all in Buffalo and Greater New York; Ohio, with 129.85 miles; and Wisconsin, with 141.25 miles, all of which is in Milwaukee. It will be gathered from these figures, therefore, that cast welding is still limited to a few of the larger cities and urban systems.

II.

RAILS AND CONDUITS.

In Table 94 detailed statistics are given regarding the weight of rails per yard, the style of rail, and the method of rendering the track a perfect return circuit by means of cast welded joints. Considerable discussion of rail will be noted in the preceding section of text. With regard to the style of rail employed there is no uniform practice. Of the 817 operating companies, 367 used T rails exclusively and 390 reported the use of T rails in connection with girder, groove, or full groove rails. The range in the weight of the rail as shown by the returns is also quite remarkable—from the 15-pound T rail of the little Paso Robles, Cal., animal power system to the 135-pound girder rail used on the Union

Traction system in Philadelphia. A number of roads have rails of very heavy section, as, for example, 128-pound on the road of the United Railways and Electric Company of Baltimore; 120-pound on several roads in Louisiana; and 113-pound, 110-pound, and 109-pound on various roads. As might be expected, the T rail is a common form in interurban work associated also with lighter weights of 60-pound or 70-pound, but it is also to be found in urban limits. In Vermont all the rail reported is of T type and none of it exceeds 60 pounds in weight. In Texas also nearly all the companies report the use of the T rail, although in Houston, girder rail up to 96 pounds per yard is in use. A good deal of T rail of light weight is also reported from California, Colorado, Connecticut, Georgia, Illinois, Indiana, Iowa, Kentucky, and Wisconsin. Girder rail, on the other hand, is reported very generally, as will be seen from the table, in Illinois, Maryland, Massachusetts, Missouri, New Jersey, New York, Ohio, Pennsylvania, and Virginia.

Third-rail systems.—The number of companies operating by the third-rail system were so few at the time of the report, that it was not deemed necessary to make a separate section of the schedule for this information. Eleven companies in five different states, with a total of 342.11 miles of track, reported this form of construction. There is no third-rail construction within city limits on the streets, but there is considerable of it on the elevated roads of New York, Chicago, Boston, and Brooklyn. The Northwestern Elevated, South Side Elevated, Metropolitan West Side Elevated, and Lake Street Elevated, all in Chicago, Ill., report the third rail, with a total of 107.96 miles of third-rail track. In New York state, the Manhattan Railway Company, at the time of the report, was operating 40 miles in New York city by the third-rail system, but since that time and during the compilation of the report the whole of its 117 miles has been converted to third rail. The Brooklyn Rapid Transit Company reported 50.40 miles of track operated by third rail. The New York, New Haven and Hartford Railroad reported not less than 25.43 miles in Massachusetts, this being all on the surface and constituting an important electrical adjunct to the steam locomotive service of the company in certain limited districts. The Boston Elevated reported 16.02 miles of track with third rail. Besides this use of the third rail within city limits the report shows, even in 1902, a considerable amount of third rail on the surface for interurban purposes, similar to that quoted in Massachusetts for the New York, New Haven and Hartford system, which had 25.89 miles of this type of track in Connecticut on its Berlin section. At the time of the report California had no third-rail interurban road, although some was then under construction and has since gone into operation. In Michigan the Grand Rapids, Grand Haven and Muskegon road reported 36.63 miles of third rail. In New York state the Albany

and Hudson Railway and Power Company reported 39.78 miles between the two cities named. This road runs through several communities of good size, where the third rail is safeguarded and has not been found any hindrance to general movement of vehicles or pedestrians. The trolley is used, however, in the terminal cities.

Conduit systems.—In connection with the treatment of roadbed and track must be considered the subject of conduit railways, since the modern conduit in electric systems, as in the preceding cable systems, constitutes practically a part of the structure. The earlier cable work in the United States was put in with a deep conduit or tube between the two rails. The conduit at San Francisco was 32 inches in depth, and that of the Chicago City Railway 36 inches. Such construction was expensive, not only on account of the excavation required, but because of the interference of the conduit with other subsurface structures. In constructing the conduit in natural soil it was necessary either to cut a formidable trench with pick and shovel or else to blast out the bed, and, on the other hand, if the line were built upon made ground, concrete foundation piers and sometimes even piles were necessary. In cable railways a grip extending down between two slot rails seizes a traveling cable, and the car is thus drawn forward, although it has no power of going backward. Many objections were urged against the system on the score that the slot caught the narrow tired wheels of passing vehicles, and that the conduit space constituted an additional gutter which it was difficult to cleanse; but the conduits were gradually made shallower, methods of removing mud and water were perfected, and the cable system had reached a high stage of development when electric traction became commercially feasible.

Having in mind the objections urged against the slot and conduit, much ingenuity was bestowed by electrical inventors on the development of electrical methods which would dispense with any such openings, but which would still bring the current to the car by means of conductors buried in the ground, in order to avoid the erection of overhead wires. These closed conduit systems have depended broadly either upon a third-rail conductor, or upon exposed knobs or contact buttons in the street bed, with which the moving car could make contact by means of a long "skate" or shoe. The section of conductor immediately adjacent to the car, electrified at the time the car passes it, becomes dead as soon as the car passes on to the next block or succession of contact devices. The connections are made by section switches, closed and opened by magnets carried on the car; auxiliary circuits, closed by the car itself as it proceeds; mechanically, or in a variety of other ways. This contact material has consisted sometimes merely of iron filings within the road contact plate. Sometimes the contact devices have consisted of plungers making contact through mercury cups at the switch box. The

only contact system of this general character now in operation in the United States is that which has been installed by the Westinghouse Electrical Manufacturing Company in the United States Navy proving grounds at Indian Head, Va., on the Potomac. This line is about 3 miles in length, is operated in part by an overhead trolley; but, as the track crosses the firing line, where the overhead wires are liable to damage by projectiles, some other system was necessary, and the contact system has been adopted. Each car is operated with two steel contact shoes, and these shoes project downward from the bottom of the car by springs, energized by storage batteries on the car, make contact with successive pairs of pins set along the track. The switch boxes and contact pins are made as a complete unit, and the contact pins, where the boxes are installed upon the track, stand up $1\frac{1}{2}$ inches above the running rail. As the car runs along the track the shoes "cut in" and "cut out" the pins so that only the portion of track over which the car stands is alive.

On the whole, therefore, it will be understood that surface contact street railway methods with closed conduits are not in vogue, and that where the overhead system is not allowed the open conduit method is the only one left permitting the use of electricity in large cities. The one other plan of bringing the current to the street car is that which is known as the third rail; but the inapplicability of this needs no discussion, the third rail being available only upon underground roads, elevated roads, and cross country lines with a more or less uninterrupted right of way. According to the returns presented in this report, of the 21,914.01 miles of single track operated by electric power, 97.2 per cent obtains current by means of an overhead wire. Deducting the mileage operated by third-rail and storage-battery systems, this leaves 1.2 per cent for the open conduit. But it is a superficial indication of the relative importance of the conduit, as it is only to be found in a few cities of dense population and extremely heavy traffic, such as New York and Washington. In both these cities the open conduit electric method has not only been applied of late years to lines of thoroughfare previously unoccupied, but has replaced entirely the cable conduit in leading streets, the most conspicuous example being Broadway, New York city.

One of the serious limitations of the open conduit method is its heavy cost of construction as compared with the overhead method. Detailed figures presented by Mr. A. N. Connett as to the Metropolitan Railway Company, of Washington, D. C., give a total construction cost of not less than \$50,000 per mile of track, and the data given by Mr. W. C. Gotshall as to the total cost per mile of single track on the Second Avenue Railway, of New York city, showed a cost of about \$58,000. Even this is far from the extreme cost reached on some lines. The real cost depends in very large part upon the amount of underground piping to be disturbed.

As there is a strong family likeness to-day among the various open conduit systems, a description of the Washington system may be taken as giving a typical view of intelligent work, although this system is not the latest in construction. The conduit, formed entirely of Portland cement concrete and resting on a concrete paved base, extends the entire width of the roadbed and 2 feet outside the outer rails. The conduit yokes go down 31 inches from the grade or surface, and the inside depth of the tube is 25 inches. At intervals of 13.5 feet manholes are provided for access to the underground work, and every 400 feet there are hatches by which the conductor rails, 27 feet long, can be inserted or removed. The conductor rails, along which the contact plow makes rubbing contact as it travels, are carried on porcelain insulators 4 inches in diameter and 7.5 inches deep over all, which are held by an iron cap and which support a bolt to which the conductor rail parts are attached like the lower horizontal member of the letter L. The conductor rails are of mild steel weighing 23.5 pounds to the yard—a weight which gives abundant conductivity for the current required to operate all the cars on the system at any one time—and are bonded together with copper bonds. It will, of course, be understood that the traction rails on the surface of the street are no part whatever of the electric conducting system, as they would be in an overhead trolley road. The slot rail of the track, weighing 67 pounds to the yard, is the same as that used on cable roads, except that a little more care is taken to provide for drainage of water from the edge of the slot. Careful provision for drainage is made within the conduit through manholes connecting with the sewer pipes about every 400 feet.

It is not to be understood that this system is general, as each conduit road has peculiarities of its own, and the same road will show modifications in conduit structure on different sections. The Lenox avenue conduit structure in New York city, which is one of the best known of the pioneer systems, began by carrying its insulators and contact rails on pedestals standing up from the base of the conduit, but these were early abandoned, and on the road as now operated the insulators and contact carriers are inverted and supported from the conduit roof, somewhat as in Washington. One of the governing conditions has been the retaining or replacing of the old cable conduit, the new electric conduit methods being modified in the former case, as upon the Third avenue line in New York city. Upon the newer sections of the Third avenue line the conduit yokes were placed 5 feet apart, and built up of three pieces riveted together, namely, a steel I-beam weighing 105 pounds, and two cast-iron side pieces weighing 122 pounds each. These yokes are planted in a 4-inch bed of concrete, and the conduit between the yokes is of solid concrete. The slot rail, weighing 66 pounds to the yard, is laid in 30-foot lengths, while the track rail of

the girder type, 9 inches high and weighing 107 pounds to the yard, is laid in 60-foot lengths. The steel conductor rail, weighing 21 pounds to the yard, is carried on inverted insulators hung from inside the slot rails.

This construction, however, is not to be regarded as standard—a word which would apply better to the practice adopted in 1897 in New York, and which has been followed in the construction of the conduit system at Brussels, London, and other foreign cities, although in several of the European cities conduit is laid under one of the rails instead of between them. Another point of difference relates to the plow rather than the conduit; thus the contact shoes used in Brussels, instead of being pressed outward horizontally, as in the New York and Washington plows, are swung out vertically in the arc of a circle, the arc being 135 degrees. Another variation in this detail occurs in Vienna and Budapest, where the plows are hinged from above and swung around in an arc of about 45 degrees. A further point of difference which is interesting to notice is that the rubbing surface of the contact device is on top of the contact rail instead of on the face or side, as in other conduit systems.

The old method was to build up the conduit from the bottom of the trench. The new method of conduit construction, as distinguished from the old, is to build downward from the slot and track, which are first aligned with the conduit yokes, the cement being then packed around a movable mold. A few words of description as to the present method, followed in New York and Europe, are given below.

A trench is first constructed of exactly the dimensions which will be taken by the completed conduit, so that the quantity of earth removed is a minimum. The yokes are placed about 5 feet apart in niches, which are carefully cut in the trench at exactly the points required. After this has been done, wooden timbers are placed across the trench to support the slot rails, at such a height that the slot rails, when placed on them, will rest on the yokes, and will be in their proper future positions. On these timbers are mounted cast-iron clamps, of just the right shape to fit and hold the base of the slot rails. The rails themselves are then set in these clamps, and joined at the top by means of a T-shaped clamp, which embraces the heads of the rails and fits into a mortise in the lower clamp. In this way the proper position of the rails is secured, and it is only necessary to align and level them by adjusting the position of the wooden timbers. In other words the track is aligned by means of the slot rails, which is the end desired, and the rest of the structure is made to conform to it. The yokes are next attached to the slot rails by means of four bolts for each yoke. The brace rods are then put in place connecting the yokes with the web of the slot rails. The only work now remaining to be done is to build up the conduit proper.

Exposed, as the conductors in an open conduit are, to

all the vicissitudes of weather, it is natural to expect that they would be liable to frequent interruption on account of the burning out of sections by short circuiting, which easily happens when moisture is present. On the whole, however, the operation has proved extremely satisfactory, and the conduit and track conditions have been far less susceptible to trouble than was expected. In fact a more sensitive and weak part of the system has been the contact plow. It is not only subject to considerable wear, but may become jammed in the slot, especially if a car should happen to get into collision with other vehicles. The applicability of the method, as well as the practical verdict upon it, is to be found in the fact that not only has it superseded the cable in New York, but it has also replaced the storage battery, and is being installed on several of the branch lines where horses are still in use, so that ultimately the whole of the city below One hundred and thirty-fifth street will depend upon the open conduit for its surface street railway transportation.

III.

ELECTRIC LINE CONSTRUCTION.

The importance of overhead trolley construction for the operation of electric railways may be deduced from the fact that of the 21,901.53 miles of track operated by electric power embraced in this report, 21,290.09 miles received the current for the cars by means of overhead wires. From the details of electric line construction, shown in Table 94, it will be seen that of the total, 15,857.26 miles, 10,220.07 miles, or 64.5 per cent is span wire; 5,223.08 miles, or 32.9 per cent, side bracket; and 414.11 miles, or 2.6 per cent, center pole. It also appears from the returns that wooden poles have been used for 80.3 per cent of this mileage and steel or iron poles for 19.6 per cent. In addition to this, 15.92 miles of line have wires supported by elevated railway structures and by buildings or bridges. The same table shows for each railway the number of poles to the mile, the average being about 52, ranging from 40 up to 75, depending upon the local conditions and requirements. The extreme figures are 30 poles to the mile, reported for the Salem Electric Railway Company, of Salem, Ohio, and 85 reported by the Duluth-Superior Traction Company, of Duluth, Minnesota.

Span wire construction.—Table 94 shows that the span wire construction reported—10,220.07 miles, or very nearly half of the overhead trolley construction—was very largely in the cities. Thus in California, with a total of 339.82 miles, 98.66 miles was reported by the United Railroads of San Francisco; 55.82 by the Los Angeles Railway; and 66.43 by the Oakland Transit Consolidated Railway. These three companies constitute a very large proportion of those of the same character within the state. In Colorado, out of the 140.16 miles, 82.02 miles was reported by the Denver City

Tramway. The state of Illinois reported a total of 799.06 miles of span wire. Of this mileage nearly half was reported in the city of Chicago. In Indiana, out of 357.80 miles, 127.40 miles was reported by the Union Traction Company of Indiana, and 36.39 miles by the Indianapolis Street Railway. In Massachusetts, with a total of 712.85 miles, a group of three roads in and around Boston—the Old Colony, the Boston and Northern, and the Boston Elevated—reported 445.50 miles. In Ohio this style of construction appears to be generally distributed, but out of the 908.56 miles, 115.41 miles were reported by the Cincinnati Traction, 69.31 miles by the Cleveland Electric Railway, and 47.87 miles by the Cleveland City Railway. In Pennsylvania, with a total of 1,532.83 miles, the Union Traction Company, of Philadelphia, reported 308.86 miles, and the Pittsburgh Railways Company, 232.09 miles. It will be gathered from the foregoing figures, therefore, that the span wire construction is to be credited with a larger track mileage than would appear on a superficial reading of the figures. In other words, there was a total mileage reported of overhead trolley construction of 21,290.09 miles, but there was only 5,223.08 of side bracket and 414.11 of center pole. These two items made a total of 5,637.19 miles, which would leave a total of 15,652.90 miles of overhead construction to be accounted for, whereas the mileage of span wire reported was, as already noted, only 10,220.07 miles. Allowing that all the center pole construction covered two tracks, and that part of the side bracket also had long brackets, enabling two tracks to be served, it would still appear that half of the span wire construction was employed to cover double tracks. This applies to the construction in many cities, as, for example, Chicago, Ill.; Indianapolis, Ind. (almost entirely); Minneapolis and St. Paul, Minn.; Omaha, Nebr.; Brooklyn, N. Y.; and Cincinnati, Ohio.

Side bracket construction.—The side bracket construction counts, of course, for every mile of track over which it extends, and in some cases, as has already been noted, covers the two tracks, the detailed statistics being, however, difficult to extract where all the methods of overhead construction were employed. Side bracket construction is obviously an adequate and satisfactory method for suburban and cross country lines where but one track has to be served, and hence, as might be expected, a large amount of this mileage, namely, 5,223.08 miles, is to be found in states and along roads where the single track is more prevalent. The state of Maine is notable for the large amount of side bracket construction which it contains. With a total of 328.55 miles of overhead construction, there was not less than 240.16 miles of the side bracket type. Massachusetts also had a very large proportion of side bracket construction, even in such crowded centers as Boston and vicinity. The Boston and Northern system reported 182.53 miles, and the Old Colony Street Railway 228.69 miles.

Out of the 75 roads or systems reporting for the state, 16 reported only the side bracket form of construction. In New York state the side bracket form of construction was not so conspicuous, only 453.04 miles being reported, and of this 82.63 belonged in one system, that of the Hudson Valley Railway, while Rochester and its suburbs presented another large group of the same style. The Rochester and Sodus Bay Railway had no span wire, but 34.86 miles of side bracket and 4.44 of center pole. The state of Ohio, as might be expected, with its interurban groups, had a large amount of side bracket construction, namely, 936.35 miles, which was very widely distributed. As previously noted, Pennsylvania had proportionately little side bracket construction, although several of its roads were extensive suburban systems. The state of Vermont, in the New England group, is noteworthy for its large proportion of side bracket, as will be seen from the table.

Center pole construction.—The center pole line construction for the whole country, 414.11 miles, should normally represent exactly twice that amount of track served, since the invariable purpose of such construction is to serve two tracks with one line of poles, by running a line of poles down the middle of a wide thoroughfare between the two tracks. Very often this center pole is masked by shrubbery, and one of the earliest and best instances was the line put in at the beginning of the trolley régime by the Washington road running out to Eckington and the Soldiers' Home. This center pole construction is widely distributed throughout the country, as will be seen from an inspection of the table. Several states possessed 20 or 30 miles of such construction, while Maryland had 40.14 miles, and New York 32.41 miles—the latter being so widely distributed that only one road had more than 6 miles of it. It will be observed that few of the interurban systems report any considerable amount of this style of construction. The interurban system most conspicuous for its center pole construction was the Grand Rapids, Holland and Lake Michigan, which reported 24 miles. The Twin City Rapid Transit system of Minneapolis and St. Paul is conspicuous for reporting 60.50 miles of center pole construction, which represents 121 miles of single track, and would account for nearly one-half of the entire 251.02 miles of that system. In California the most notable instance was that of the Los Angeles Pacific Railway, an interurban system, which reported 20.65 miles of center pole, accounting for more than 40 miles out of the total of 87.48 miles of track.

Line supports.—Table 94 shows in detail, in terms of mileage, the statistics with regard to the use of steel or iron poles and wooden poles. It will be seen that 12,728.76 miles of track were reported as equipped with wooden poles and 3,112.58 miles with steel or iron poles, making a total of 15,841.34 miles, which apparently would represent the actual mileage of the streets and

other thoroughfares occupied by the overhead construction. This mileage, however, has no definite reference to the miles of track, as such, whether single or double, as a mile of overhead construction might obviously be inclusive of both conditions and methods. The metallic pole, although its use is quite widely distributed, is not found in some states. Illinois reported 264.35 miles; Massachusetts, 294.91 miles; New York, 485.28 miles; Ohio, 302.41 miles; and Pennsylvania, 540.20.

A study of the figures will show that the metal pole was used chiefly within city limits; thus, companies in Chicago, Ill., Detroit, Mich., Minneapolis and St. Paul, Minn., and Philadelphia and Pittsburg, Pa., reported nearly all of the metal poles shown for the states in which these cities are situated; and companies in St. Louis, Mo., Boston and Springfield, Mass., Cincinnati, Cleveland, and Columbus, Ohio, and New York city, N. Y., reported a large proportion of the metal poles of the states in which they are located. There is an aesthetic advantage in the use of metal poles, as compared with wooden poles, aside from their more sightly appearance, in that, on the average, fewer of them are required per mile of electrical construction. The number of metal poles per mile is usually from 40 to 50, though in some cases, as in certain places in Ohio, 60 or more poles per mile were reported.

With regard to the use of wooden poles, it may be noted that of the 12,728.76 miles equipped with such poles 1,724.64 miles, or 14 per cent, was reported for Massachusetts; 1,554.79 miles, or 12 per cent, was reported for Ohio; 1,452.19 miles, or 11 per cent, for Pennsylvania; and 1,047.20 miles, or 8 per cent, for New York state; these four states together, therefore, reported 45 per cent of the total for the country.

Feeder construction.—A large proportion of the feeder wire mileage was carried overhead and on the poles referred to above, and very little of it—2,411.07 miles out of 24,754.29 miles, barely 10 per cent—was underground. The use of the overhead method for feeder wire was so general that the exceptions alone deserve study, and these are presented in Table 94, which shows that the underground feeder wire mileage occupied 589.3 miles of street within city limits, in connection with some 27 of these railway systems, though these systems in some cases represent two or more cities. The largest amount of such underground feeder wire construction was found in three states, which together accounted for about 78 per cent of the whole, namely: Pennsylvania, with 204.8 miles of street and 1,685.8 miles of duct; New York state, with 145.8 miles of street and 3,317.1 miles of duct; and Wisconsin, with 110.8 miles of street and 674 miles of duct. In these three states the feeder conduit work was limited almost entirely to the three cities of New York, Philadelphia, and Milwaukee.

Further details of feeder construction are furnished in supplementary Table 2, which shows the statistics for

the different kinds of conduit used. In this connection it may be stated that the cable most commonly used was copper strand, heavily insulated, and sheathed with lead, the copper conductor being further protected in some instances, as in New York, by special paper insulation. The largest proportion of feeder conduit was constructed of terra cotta and vitrified clay. The 336.6 miles of street occupied and 3,905.1 miles of duct, used by this kind of conduit, amounted to more than half of the whole conduit feeder mileage. Iron pipe conduit occupied 156 miles of street, with 1,981.4 miles of duct. Terra cotta and vitrified clay conduits were used exclusively in Wisconsin, while in New York and Pennsylvania iron pipe was also used, as well as a certain amount of wooden duct. New York reported the greater part of the 13.5 miles of street with concrete construction. As to wooden duct, out of 83.2 miles of street occupied by 565.1 miles of duct, 76.2 miles of street, and 542.5 miles of duct were reported from Philadelphia, Pennsylvania.

While it is urged by many who are interested in the aesthetic improvement of urban centers that the overhead network of a trolley road is ugly and an eyesore, it can not be denied that in this branch of the work a most marked and rapid improvement has been seen, both with respect to the appearance of the line and in regard to its stability. The early construction left much to be desired, and the materials used were altogether too light and cheap for the conditions imposed upon them, while a great many details now making for trimness and permanence had not been worked out. One of the greatest drawbacks was found in the fact that for some years it was considered necessary to put upon the poles, not only the small conductors with which the trolley wheel makes contact and the necessary supports, but also all the mains and feeders delivering current to the lines as a whole. In fact this practice still prevails to a considerable extent in regard to feeders, as may be inferred from the fact that of the 24,754.29 miles of feeder wire 22,343.22 miles, or 90.3 per cent, was overhead.

At the time of the report conduits for feeders were employed by only 27 companies, but the tendency to remove the heavy cables and conductors from the poles is becoming very marked, and in the next few years, especially within city limits, a very large proportion may be expected to be taken down and put out of sight. The fact that underground construction is still limited to a few cities is shown by the fact that Washington, Chicago, New York, Boston, Philadelphia and Milwaukee contained 6,136.3 miles of duct, or 93.7 per cent of the total in the United States.

Overhead trolley.—The construction of overhead systems has been greatly simplified since the time of the report on street railways for the census of 1890 by the general adoption of the single overhead trolley system, by means of which the track is used as a part

of the return circuit to the power house, one overhead wire bringing the current to the motor. The double overhead trolley, which was often used before 1890, was soon found to introduce a great many serious complications. Not only do the two wires necessitate additional overhead structure and wiring to support them, but the cars must carry two trolleys. When the car has to pass switches and frogs, changing the direction of the overhead contact, a vast amount of complication ensues. In short, the difficulties and objections have been such that in 1902 only 7 companies reported the use of the double overhead trolley system, the total mileage of track thus operated being only 234.15. Nearly all of this was reported from Cincinnati, and all of it would be gladly discontinued by the companies but for purely local convenience or for the requirements of old ordinances and franchises insisting upon the maintenance of this method.

The nature of pole line adopted for overhead construction depends a great deal upon the width of the thoroughfare, the extent to which the district is built up, the style and quality of surrounding buildings, and the restrictions imposed by the public authorities. As has already been noted, a very large proportion of the construction is of the "span" type, which consists in setting poles along the street at regular distances in pairs, exactly opposite to each other, and then spanning the roadbed by means of a span wire. This is repeated at each of the poles, and the service wire, with which the trolley wheel makes contact, is attached to the span wire and carried along underneath by insulators. The span wire is necessarily strong and, as a general thing, consists of galvanized iron and steel stranded wire, an ordinary size being five-sixteenths of an inch. If the street is unusually wide, the size of the wire across the roadway and the two tracks may run as high as three-eighths of an inch, while on the other hand, quarter-inch wire will be used for a single track span. A large number of detail parts are necessary to insure solid and substantial suspension, and to prevent the possibility of breakdown, which would not only inflict injury on persons and property, but interrupt the operation of the road.

To quote specific examples, at Indianapolis, Ind., the size of the span wire varies from three-eighths of an inch to five-eighths of an inch, according to the width of the street and the strain imposed, and the trolley wire held up is No. 00 round wire, a strain insulator being placed in the span wire next to each pole. In St. Louis in the latest construction of span wire a 7-strand double galvanized steel wire five-sixteenths of an inch thick is used. The trolley or service wires are insulated by a joint strain insulator at the pole and by a trolley wire hanger with wooden insulation, a bolt in which a cone shaped piece of wood furnishes the insulation. The ear for holding the trolley wire is 15 inches long and is clinched or hammered in order to hold up the wire, no solder

being used. In Milwaukee, Wis., a notable change from the ordinary line work has been the abandonment of insulated trolley wire hangers, those employed being entirely of metal. Insulation is secured by strain insulators in the span wire itself, of which there are two in series between the pole and the trolley wire. The trolley wire hanger is of the usual appearance, except for the omission of the insulating bolt, and being purely mechanical in its function and not requiring insulating qualities, it can be made very substantial. Another feature of the Milwaukee construction is that known as "figure 8" trolley contact wire, the wire in cross section resembling that numeral, allowing the ear of the insulator to clip the upper part more firmly. In Philadelphia, Pa., the practice differs from that of both St. Louis, Mo., and Milwaukee, Wis., in the fact that a round top bell trolley wire insulator is used with soldered ears 15 inches long and weighing 14 pounds. The Twin City Rapid Transit Company of Minneapolis and St. Paul, Minn., uses a trolley wire hanger of its own manufacture, in which the insulation is secured by a structure of wood supported in the metal from the bracket or span wire, in each end of which the trolley wire clips are supported.

In addition to carrying the span wire, which in turn carries the contact conductor, the poles, as has already been noted, have to support feeder cables, which are necessarily of considerable weight, usually being of copper, though aluminum is sometimes used. Moreover, the feeder cables carrying large quantities of current require extra large and heavy insulators, for which glass or porcelain is generally used, though sometimes a compound of mica and shellac, rubber, or asbestos is used. The feeder cable runs parallel to the track, and is tapped at frequent intervals in order to supply current to the different sections of the trolley system. These taps are made from the top of the pole across the span and connected to the trolley wire at numerous points. Sometimes these feeder taps are used as a span wire.

Nor are these wires and circuits all that go to make up the web-like network of wires which are seen above a trolley track, and more particularly above a double track covered by the span wire system. At corners and curves a large number of auxiliary span wires and brace and guy wires have to be introduced, all adding to the apparent complication of the system. In many places, moreover, local ordinances still require that guard wires shall be used above the trolley network to prevent broken telephone, electric light, or other wires from falling across the trolley system. Where these are added the result is usually very disagreeable to the eye. Street railway managers are decidedly averse to this addition to the wire structure, claiming that the guard wires rarely serve a useful purpose, and are more often the cause than the cure of the evils they are designed to obviate. A feature of span wire con-

struction which is not uncommon in Europe, but which is hardly known in the United States, is that of carrying the wires across the street without poles, from building to building, attaching the span to rosettes of metal firmly embedded in the fronts of the houses. This method is frequently permitted by the authorities, and the entire absence of poles gives a much clearer vista to the thoroughfare along which the trolley system is in operation.

Next in importance to the span wire construction is that which is carried out by means of side brackets. The purpose of the side bracket or side arm construction is to decrease the cost of line construction as well as to lessen the number of poles along the street, it being feasible to extend the side arm from the pole to such a length as to carry the circuits for a double track system. The side arm projection from the pole is braced from below, and is also often supported from above, to insure rigidity. The methods of suspending the trolley service wires are much the same as with span suspension, the chief difference being, perhaps, in the insertion of insulating materials between the arm and the iron sleeve by which the insulator is carried.

Another variation in overhead construction is the use of the center pole, which is virtually a duplication of the side bracket pole, the arms being extended out on both sides of the pole, the pole being planted in the middle of the street or avenue, midway between the two tracks. With the center pole construction a greatly improved appearance of thoroughfares is often obtained. The center pole is also often utilized for lighting purposes, especially where the city ordinances require that a certain amount of lighting shall be furnished free by the trolley company in part return for its franchise; and some extremely pretty effects are often obtained, especially where the poles are of ornamental character. The center pole construction, however, is not favored, as it forms an obstruction to traffic, being in the center of the street.

Wooden poles constitute a very large proportion of the supports employed in overhead line construction. The greatest variety exists with regard to the nature of the woods used and the treatment adopted in preparing poles for use and in setting them. The wood favored depends very often upon the proximity to the forest where the poles are cut, but the kinds in most general use are chestnut, cedar, or Georgia hard pine. Chestnut poles are preferably of second growth, and are used up to a length of 45 feet. Cedar poles do not possess the elastic or tensile strength found in hard pine or chestnut, and are not favored in lengths over 45 to 50 feet on account of their liability to succumb to the strain of storms and the weight of conductors. In a general way the poles used are trim and straight, with a departure from the center line of not more than 4 or 5 per cent, and they are often trimmed and made hex-

agonal or octagonal in shape, as well as painted in some standard color adopted by the system.

On the suburban lines of the United Railways of San Francisco the standard type of pole is 30 feet long, 12 inches at the base, and 8 inches at the top, the material being redwood, which, of course, is hardly obtainable in other parts of the Union. On one of the systems in Brockton, Mass., most of the poles are of chestnut 30 feet in length, with 7-inch tops, set 5.5 feet in the ground, and carrying arms of Georgia pine, which are equipped with four locust pins to hold up the insulators and wires. On the Schenectady, N. Y., system, where the city overhead work is all span construction, 35 and 40 foot chestnut poles are used, set 100 feet apart. On the Ballston, N. Y., branch, the center-pole double-bracket construction is used, with 35-foot octagonal pine poles embedded in concrete.

The extent to which wooden poles have been used in this country is undoubtedly due in a large measure to the ease with which such poles can be obtained. In Europe, where wood is scarcer, the metal pole is much more generally used. It may be questioned, however, whether the use of iron and steel poles in this country would not make a much better numerical showing than it does were it not for the enormous extent of suburban and rural lines, of which wooden poles are so conspicuous a feature.

The iron and steel poles in use are tubular and are built up in sections to a height of as much as 50 feet. Of the sections, generally, three or four are used to a pole, with a cap and base, which in some cases are ornamental. Occasionally a metal pole is seen which is "built up," i. e., composed of several iron or steel channels joined together. Another variety of the metal pole is one that is made in one length and is seamless, constituting a solid drawn steel tube, although these are sometimes built up of two parts shrunk together. A standard American iron trolley pole with a length of 30 feet, built up in three 9-foot sections, weighs a little over 500 pounds. Some of the poles, however, are much heavier than this, and a standard pole of an all over length of 30 feet also weighs almost 800 pounds. The size and weight and ability to resist strain depends, in fact, very much upon the policy of liberality adopted by the company building the system. Where the pole is of the usual sectional type the various sections are sweated or welded together, and care is taken that the longitudinal seams in each consecutive piece are 120 degrees apart in order to increase the strength and distribute the strain, which with ordinary poles will reach almost 500 pounds, since in winter the poles frequently have to carry not merely the weight of the wires but an additional burden of ice and snow or sleet.

To take a few typical illustrations of current American practice, the Boston Elevated Company employs for straight work a three-section tubular pole weighing

from 700 to 800 pounds with tapering sections 6.5 inches, 5.5 inches, and 4.5 inches in diameter. Even heavier poles than this are used where a greater weight of overhead structure has to be held up, these poles weighing as much as 1,050 pounds, while on curves the tubular poles reach a weight of not less than 1,450 to 1,500 pounds. In Indianapolis, Ind., the poles are in three sections, weighing 600 pounds for straight line work and 1,400 pounds at curves. In Milwaukee, Wis., the poles used for straight line work are 28 feet long, built up of two sections of tubular steel, 8 inches and 7 inches, respectively, in diameter, and set in concrete. In St. Louis, Mo., the standard poles for straight line construction are in 28-foot and 30-foot lengths, with a weight of 545 and 650 pounds, while on curves 1,025-pound poles are used.

IV.

BRIDGES, TUNNELS, AND CROSSINGS.

Bridges.—Supplementary Table 1 gives the statistics with regard to the number and length of the different classes of bridges. These data include only structures owned by the railway companies, and no statistics as to the number or length of structures employed by the street railway companies under lease or franchise or other condition of that character are shown. A total of 2,721 bridges with a total length of 461,109 feet, or more than 87 miles, is reported for the United States. Of these bridges, 1,024, with a length of 156,061 feet, were of iron and steel; 574, with a length of 57,152 feet, were wooden; 931, aggregating 242,458 feet in length, were wooden trestles or trestle bridges; and 192, with a length of 5,438 feet, were of masonry. It will be seen from these figures that wooden bridges and trestles predominate, but that the work is of a varied character and that already a large proportion consists of iron and steel. Some features of this work vie with that of the same character done on steam railroads.

An interesting example of bridge construction is found on the line of the Conneaut and Erie Traction Company's railway completed since the figures of this report were taken and therefore not embraced in the above totals. This road, which renders possible a continuous electric railway trip from Detroit, Mich., to Westfield, N. Y., traverses such rocky and irregular country that considerable cutting, filling, and trestle work was necessary. One of the most serious difficulties was that encountered near Conneaut, where it was found necessary to build a steel viaduct.

One remarkable instance of trestles built for trolley work and of wooden construction is the bridge owned and operated by the San Francisco, Oakland and San Jose Railway Company. As the statistics embraced in the table indicates, the street railways around San Francisco and Oakland have long stretches of wooden bridges and wooden trestles, probably rendered necessary by the shallowness of San Francisco bay and other

local conditions. In addition to these is the double track trolley pier which has a total length of 16,400 feet, with 14,423 feet of tangent track on the pier, and a height of rail above high water of 7 feet 9 inches. Regular 4-car trains ply over this trestle. The overhead construction is of the regular trolley type with cross suspension wires.

Another example, the New Jersey and Hudson River Railway and Ferry Company, in New Jersey, embraces in its line a variety of interesting illustrations of the amount of work that a street or interurban railway may have to do in this category. An extension of this system, made in 1900, although less than 3 miles in length, includes a steel viaduct 1,150 feet long, with a 70-foot plate girder span over the Northern Railroad of New Jersey; a double trestle 580 feet long with 70-foot plate girder draw over the Overpeck creek; and a steel viaduct with a 500-foot plate girder span over the West Shore Railroad. The foundation of the long steel viaduct had to be laid in a marsh, and it is interesting to note that while the company found that the estimates for a wooden trestle were lower than for the steel, the latter was more desirable, not only on account of its durability, but in order to avoid the danger of destruction by fire, the marsh and meadow grasses often catching fire in the fall in such a manner as to jeopardize any construction of wood.

Another important and interesting example of such work is the swing draw across the Hackensack river, giving entrance to the town of that name. As this is one of the largest drawbridges in the country, if not indeed the largest, employed for electric railway work exclusively, it deserves note. The approaches to the draw are over trestles at each end, the western trestle being 915 feet in length and consisting of 61 bents of 15 feet each, while the eastern trestle is 285 feet in length and consists of 19 bents of 15 feet each. The swing or draw of the bridge is 160 feet in length, and is equipped with electric motors and trains of gearing so that it can be opened and closed in one and one-half minutes. The bridge is designed to carry a full load of 30-ton cars on each track.

In general, no figures with regard to elevated railroads and inclined planes are included in this table, although it might be claimed that these were wholly of a trestle character or in the nature of a viaduct. Elevated railroads, however, have been considered and treated *sui generis*, though some figures with regard to bridges employed by the Brooklyn Rapid Transit system in connection with its surface track have been included in the table.

Tunnels.—Supplementary Table 1 includes also data with regard to tunnels employed in connection with street railway work. There were 27 of these, with an aggregate length of 19,803 feet. Up to the present time street and interurban railway work has been almost entirely free from tunnel construction. On grades



TYPICAL ENTRANCES AND EXITS, BOSTON SUBWAY.



ONE OF THE PASSENGER STATIONS IN THE BOSTON SUBWAY.

where the heavier nature of steam railway traffic would have required tunneling, the lighter character of street railway rolling stock and the conditions under which the smaller number of passengers has to be carried have usually enabled the street railway systems to avoid tunneling. A large proportion of the track also is laid in cities and villages where tunnels are rarely needed. Interurban roads, however, sometimes operate under physical conditions closely resembling those that have governed steam railway practice, and a considerable development in the matter of tunneling may therefore be expected to attend the extension of interurban construction and the change in the character of electric railway service.

Of the total length of tunnels, 19,803 feet, reported for the country, a length of 16,285 feet, or 82.2 per cent, was reported from three cities, Boston, Chicago, and New York. In Chicago, where, on account of the extremely level character of the country, one would perhaps scarcely expect to find a tunnel, there are five tunnels, with a total length of 5,971 feet under the Chicago river. They were built years ago to avoid the delay that would be a necessary incident of the traffic if the cars were compelled to wait for the opening and closing of drawbridges. The Park avenue tunnel, in New York city, accounts for 1,800 feet of the tunneling reported in the table. This tunnel, which runs from a little south of Thirty-fourth street, through Fourth and Park avenues, to Forty-second street, is to all intents and purposes a steam railway tunnel, and for most purposes may best be regarded as forming a part of the system by which the New York Central and Hudson River Railroad penetrates to the heart of the city. Indeed, the street railway to which this tunnel belongs was formerly under Vanderbilt ownership, and was one of the traction lines out of which grew the New York Central system. The tunnel therefore represents steam railway practice rather than a practice made necessary by actual street railway conditions. The greatest length of tunneling shown for any one company, city, or state is that reported by the Boston Elevated Railway Company, Boston, Mass. The tunnel used by this company in its subway service is 8,554 feet long, and it represents one of the most interesting and important developments of recent years in street railway work, marking perhaps a transitional stage in street railway operation. It lessens the congestion of traffic on the streets, while at the same time it obviates the need of resorting to a deep underground railway, like that now under construction in New York city. Indeed, it seems to have served its purpose admirably in almost every respect.

This tunnel system was laid out and carried through by what is known as the Boston Transit Commission, a body still pursuing further useful work of the same kind. After a preparatory period of several years the subway became available to the public in 1897. In a general way, the subway may be said to traverse the city from north to south, with a westward spur under

the Boston Common and the Public Garden, the northern limit being the Union Station and the southern limit being in the vicinity of Tremont street on Boylston street. The street railway lines enter the heart of Boston from the north, west, and south, the east being water front. A majority of passengers leave the cars before or upon reaching the termini of the lines on the edge of the business section, but a large number find it necessary to continue their journey across and through the city to other districts or suburbs, and the subway meets their need for quick transit. Since the tunnel went into operation the original plan of the commission, that the subway should be used only for cars of street railway types, in single or two-car trains passing from the surface tracks, has been modified to permit the running of elevated railway trains through the subway from the elevated tracks of the Boston Elevated Railway Company.

The original contract for the use of the subway made between the commission and the West End Street Railway Company provided for the payment to the city of a fixed annual rental equal to $4\frac{1}{2}$ per cent on the cost of the subway, payable quarterly, and for a further contingent payment to be determined as follows: All cars of a body length of 25 feet or less were to be reckoned as paying to the city a rate of 5 cents per car per one-way trip, longer cars to be rated proportionately; and if the amount so computed should in any regular three-month period exceed one-fourth of the rental payment mentioned above, the West End Company was to pay such excess, in addition to the fixed quarterly payment. During the quarter ending March 31, 1902, the company ran 1,038,097 one-way trips through the subway, estimated on the basis just explained. The cost of the subway to September 30, 1902, is set down as slightly over \$4,000,000. A rough calculation shows, therefore, that the excess on contingent payment for the quarter must have been more than \$2,000, the fixed payment being taken as about \$49,000. The rental is based on a twenty-year lease.

Two types of construction were adopted for different sections of the subway. One consists of steel I beams, embedded in concrete, supporting a roof constructed of transverse steel beams or girders with brick or concrete arches between them. The standard height of this construction is 14 feet clear, above the top of the rails, the width of two tracks being 24 feet and of four tracks, 48 feet. The four-track subway has a line of steel posts along the center. The top of the rail is about 17 feet below the surface of the street and the station platform about 16 feet. The second form of construction consists of masonry side walls and a masonry roof. This form was adopted where the tunnel could be placed at a sufficient depth below the surface to make possible adequate provision for strength and stability by masonry construction, and where digging for sewers would not be likely to injure it. Elaborate pro-

vision was made for drainage, ventilation, and illumination, the light being furnished by arc and incandescent lamps. It was early decided that the two easterly tracks of the four-track subway should be for north bound cars and should have island platforms between them and that the westerly tracks should be for south bound cars, and should also have island platforms between them. The platforms have been built as near the surface of the street as practicable in order that the stairways might be as short as possible. The subway is entered by handsome little stations at the street level, giving independent access to each track. At the Public Garden, by exception, one enters the subway on the street level, the cars entering and leaving the tunnel through an open avenue which leads, by a general slope 318 feet long, from the surface of the ground to the subway portal, which is inclosed by an iron fence with granite walls and concrete masonry.

Steam railway crossings.—The subject of bridge and tunnel construction is allied in some degree with that of safety provisions for steam railway crossings. The schedule of inquiry embodied a request for information as to the number of such crossings protected and of such crossings unprotected. From the statistics shown in Table 94 it appears that there were 4,481 steam railway crossings encountered along the tracks of street railway systems. Of these, 2,514, or 56 per cent, were protected, and 1,967, or 44 per cent, were unprotected. The protection referred to varies in character; in some instances it includes the depressing or raising of the tracks. Where a crossing is made by an overhead track, the street railway company naturally employs a bridge or viaduct, and such construction would be included in the returns already discussed. On the other hand, where the street railway depresses its tracks, the steam railway, of course, crosses over the street railway on its own bridge. These matters are generally a subject of adjustment between the different interests, although in many cases the dispute over right of way has been attended by litigation and even by physical conflict and the tearing up of tracks. Crossings are also said to be protected when provision is made for giving warning by a flagman or an alarm bell, but provision of this nature has but too often been found inadequate. Serious accidents and fatal collisions, due to the failure of such protection, are fresh within

the memory of the public. Within recent years, work of a costly and elaborate character has been undertaken in such cities as Chicago and New York to obviate the need of having the street railway and the steam railway lines cross at grade. The New York Central and Hudson River Railroad Company, whose lines lead immediately into Manhattan Island, were crossed on the level by street railways at numerous points, until the completion of the viaduct and of the sunken way which now extends for miles out into Westchester county. The reform in this direction of late years has been quite considerable in all large American cities, and has been prosecuted at an enormous expense, so that, of the steam railway crossings now reported as unprotected, a large proportion are to be found in rural districts. Strictly speaking, they seem to be most numerous along the fast interurban roads which necessarily cross main lines of steam railway in outlying regions with such infrequency as not to necessitate any elaborate measures of precaution, but permitting both the steam railway company and the interurban street railway company to depend upon the intelligence of the motorman and conductor, governed by the rigid rules laid down for their guidance as to behavior at such intersecting points. The general practice with all street railways is to cut the overhead circuit at the railroad, so as to avoid any obstruction there, and to carry the street railway cars across by their momentum. The American Street Railway Association has in recent years endeavored to establish a national code of standard rules for the men employed. The development of interurban signaling may be gathered from the fact that for the year 1902-3 the special committee on this subject presented a section of about 2,000 words containing suggested rules, whereas before that time no special rules had been suggested, except a few on the subject of semaphores and color signals. While these rules do not necessarily or even largely relate to steam railway crossings, they do embody a variety of careful and explicit instructions, the observance of which should in every case be sufficient to prevent any accident. As a general thing, the methods of signaling advocated and formulated by the association committee follow closely the methods employed on the steam railways, and the rules, as reported, have proved satisfactory to the state railroad commissioners to whom they have been submitted.

CHAPTER III.

CARS AND MISCELLANEOUS EQUIPMENT.

I.

STREET RAILWAY CARS.

General statistics.—The statistics of cars and miscellaneous equipment connected with cars are to be found in Table 95. There were 66,784 cars of all classes reported to the Bureau of the Census, or almost exactly 3 cars per mile of track. Of this number, 60,290 were passenger cars and 6,494 were cars used for express, company work, or other purposes. Of the passenger cars, 32,658 were closed and 24,259 open, the latter style being reported very generally by all the companies, both North and South. One hundred and five companies reported 3,134 combination closed and open cars, of which 1,203, or 38.4 per cent, were used by 22 companies in California alone, the state in which the combination car had its beginning. Subsequent portions of this chapter deal with the evolution and typical features of this type of car, which bids fair to become a prevalent, if not a preponderant, style in the near future. Combination passenger and express cars were reported by 99 companies, the number used being 239. Cars used for more than one service have been enumerated but once. Cars carrying express, mail, etc., in addition to passengers have been classified as primarily passenger cars, the other service being more or less incidental to the regular functions of the car.

The use of special express, freight, and mail cars was reported by 205 companies. The largest number of these cars was shown by an interurban freight line, the St. Louis and Belleville (Ill.) Electric Railway Company, operating in the vicinity of St. Louis, which, with 213 cars and 2 electric locomotives, reported 209 cars for express, freight, and mail purposes. These cars, however, were without electric equipment, so that this road could hardly be taken as typical of the manner in which a freight service has been built up in connection with a regular passenger system. The 1,727 snowplows reported do not include snowplow attachments of a removable character, but are cars regularly and exclusively used for clearing the track. This is true also of 793 sweeper cars, while cars employed as both sweepers and snowplows are counted but once in the class in which the larger part of their work would place them.

Out of 66,784 cars of all classes reported, 50,699 cars were provided with electric equipment. The roads operated entirely, or in part, by electricity reported a total of 65,949 cars of all classes, the number provided with electric equipment being 76.9 per cent of the total.

Distribution of cars.—The largest number of cars of all classes was reported by the state of New York, with 14,040, or slightly more than 20 per cent of the total. Of this number, a little more than one-half was reported by three systems: The Interurban, of New York city, 3,063; Brooklyn Rapid Transit (surface and elevated), 3,504, exclusive of 121 steam locomotives; and the Manhattan (elevated), 1,331, exclusive of 292 steam locomotives. The figures of the Interurban, in New York city, should include additional cars of the other systems operating under the same management, which are reported separately. The total number of cars reported in the state of Massachusetts was 8,310, of which 3,612 were owned by the Boston Elevated Railway Company. This is the largest number reported by a single company, and includes cars operated on surface, elevated, and underground tracks. Illinois is third, with 7,788, of which about two-thirds were reported from Chicago. The other important states are as follows: Pennsylvania, 7,058 cars, of which 3,283 were returned by the Union Traction Company, of Philadelphia, and 1,252 by the Pittsburg Railways Company, of Pittsburg; Ohio, 4,395 cars, the largest number, 1,105, being reported by the Cincinnati Traction Company; Missouri, 2,484 cars, of which about half were to be found in and around St. Louis, the St. Louis Transit system alone reporting 1,179; New Jersey, 2,165 cars, largely engaged in New York suburban business on the New Jersey side of the Hudson river; California, 2,056 cars, of which 1,005 were reported by the United Railroads of San Francisco; Michigan, 1,757 cars, of which 920, or more than one-half, were the property of the Detroit United Railway Company; Indiana, 1,146 cars, a large proportion of which were in service in and around Indianapolis; and Minnesota, 1,083 cars, nearly all being operated on the Minneapolis-St. Paul system.

Express, freight, and mail cars.—Two hundred and five companies reported a total of 1,114 cars devoted

solely to express, freight, or mail business. The largest number reported by any one company was that of the Belleville (Ill.) system, which, as already noted, is a freight road rather than a street railway within the common acceptance of the term, and which had one or two electric locomotives to haul its ordinary freight cars. The freight and express business is largely confined to inter-urban roads, but mail street cars are employed in a number of cities. The states showing the largest number of cars of this class are New York with 181 and Massachusetts with 94.

Work and miscellaneous cars.—The distribution of work and miscellaneous cars does not call for much comment, as practically every independent street railway system requires such an equipment for its ordinary maintenance and operation, and the larger the system the greater, necessarily, will be the number of such cars. The number of these cars owned by any road depends upon the amount of repair work done, the length of track covered, and the amount of construction work performed by the company's own force and equipment. The states showing the largest number of cars in this class are New York with 452 and Pennsylvania with 285.

Snowplows and sweepers.—For the United States, as a whole, 1,727 snowplows were reported. Out of the number thus given, 740, or nearly one-half, were reported for the state of Massachusetts, and of these 534 were owned by the three systems of Boston and its suburbs. New York state reported 241, of which 70 were owned by the two leading systems in New York city and Brooklyn. Sweepers, reported separately in the table, are sometimes employed for the same purpose as snowplows. The snowplow is equipped with a share, usually so adjusted that it is free to conform to the unevenness of the rails, and is often provided with an indicator showing the exact height of the share from the rail. The plow pushes the snow by sheer force to the side. The sweeper, on the other hand, is equipped with rotary brooms or brushes, the brooms being set at an angle to the shaft and also at an angle to the car track, so that they throw the snow clear of the rails rather than ahead. The brooms can usually be raised or lowered by levers, and some of them are double-enders—that is, with a broom or sweeper at each end of the car. Both snowplows and sweepers are necessarily heavily motored and are ordinarily run over the tracks at high speed. While sometimes used for snow removal, the sweeper is commonly employed for street cleaning purposes, and in some cases has sprinklers attached, so that the street can be sprinkled ahead of the sweeper brooms, or after it, as desired. There were 793 sweepers reported for the United States, of which New York state reported 188 and Pennsylvania 155.

It is obvious that an additional burden is thrown upon roads situated in the snow belt, which are compelled throughout the winter months to operate con-

stantly one or both of these forms of apparatus for keeping the tracks clear. In like manner third-rail roads in the more northerly latitudes often have rail trouble to contend with, in addition to keeping their tracks clear of snow, especially if such roads are on the surface. This trouble is due to the necessity of keeping the head of the third rail clear of ice and sleet, which forms a partial insulation and prevents the delivery of current to the contact shoes. This difficulty has been met generally, not by separate cars for clearing away the ice or sleet, but by placing sleet cutters or grinders under the sills of the traveling cars, so as to clear the way for the shoes just behind. It is of course easy to equip the plow or sweeper on such roads with these additional devices for keeping the whole track clear.

No figures were obtained separately as to the expense of snow removal, but in a long and hard winter the addition to operating expenses due to this cause is quite marked. The report of the railroad commissioners for New York state for 1902 includes some very interesting figures on the subject. The Metropolitan Street Railway Company, of New York city, reported for that year, the winter of which was a moderate one, an expenditure of \$43,826 for the removal of ice and snow. The Brooklyn Heights system reported \$44,014 for this purpose, in addition to \$13,449 for cleaning and sanding the track. The Rochester Electric system reported for the same two items, \$10,388; the Buffalo Street Railways, \$6,691; and the International Railway Company, operating in the Niagara region, reported for the removal of ice and snow alone, \$15,656. The Hudson Valley, operating through the northern portion of the state, reported \$3,392 for the removal of ice and snow and cleaning track. At Schenectady the outlay reported by the company was \$3,394 for removal of snow and ice and \$2,554 for cleaning and sanding track. Such figures as these indicate the heavy expense incurred in dealing with the weather conditions in the Northern states.

II.

PASSENGER CARS.

Early styles.—Few classes of street railway equipment have undergone greater changes than have cars and trucks. The very first cars used were nothing but stagecoach bodies running on tracks, and for many years, in street railway as in steam railway coaches, could be traced the signs of their origin in the curves of the old stagecoach body.

There was soon manifested a tendency, however, to give to street cars a square or box-like form corresponding to that of the steam railway cars about the middle of the last century. The pattern of the old universal 16-foot horse car, similar in design to that of the stagecoach, persisted, however, up to the time when cable traction was introduced, and even to-day some of the old-fashioned "bobtail" cars still exist. These



TROLLEY MAIL AND PASSENGER CAR, BOSTON, MASSACHUSETTS.



INTERURBAN TROLLEY EXPRESS CAR IN MICHIGAN.

early cars were of very light construction, the body being entirely of wood, lightly veneered, the wheels of iron, and the cars themselves almost as springless as a country buckboard. An example of this form of car is shown opposite page 160, the cut being made from a photograph secured by one of the special agents of the Bureau of the Census while collecting data for this report in Alabama.

The cable, however, compelled street car builders and street railway managers to face the new problems of weights and strains, and one of the first results was the abandonment of the bobtail car, and the construction of vehicles of larger carrying capacity. Mr. John Stephenson, the famous American street car builder, has stated that in 1882, out of 428 roads then in operation, 279 were equipped with small bobtail cars and only 149 had large cars requiring a conductor as well as a driver. At that time two-thirds of the orders on his books were for the small cars. He stated that one of the main reasons for their use had been that three of the small cars could be used successfully when two large cars had proved a failure, the three giving a somewhat quicker schedule. Another reason was that the short bobtail car avoided strain on the horses. Two horses seldom start together, but in the case of a bobtail car one horse could easily do the work with better footing on the track. The objection to bobtail cars that passengers found difficulty in pushing their way to the front of the car to deposit fares in the box under the eye of the driver was, he thought, overcome by the device, then new, known as a "fare conveyer." This consisted of metal tubes passing around the interior of the car, and sloping from the rear down to the front in such a manner that a coin deposited in the tube, acted upon by gravity, would roll down into the fare box. Such conditions were, of course, improved by the introduction of the conductor on the horse lines, and largely disappeared when the cable car was introduced.

The labor of animals under the old horse car system was very severe, and their lifetime in the service was brief. The most severe strain was in the frequent stopping and starting of cars, during which the horses wrenched themselves, slipped and fell, and were compelled every few hundred yards to pull a heavy load from its dead rest. In New York city full cars often made a dozen starts from dead rest within the distance of two city blocks. It was estimated at this time that this strain resulted in shortening the life and utility of horses in the service on the average from three to five years.

An element of risk and uncertainty in connection with the use of the horses was found in their liability to disease, which sometimes took an epidemic form, completely paralyzing large railway systems. The daily travel of a street car horse averaged only 10 miles with single cars and 15 with double cars. With one day in seven given to the horses for rest, a large

number of relays were required, and hence huge stables became necessary. Many of these had to be placed in parts of the city where real estate was expensive. At the same time the presence of such an establishment tended to reduce the value of property in the vicinity on account of odors and other unsanitary conditions. In hot summer months large numbers of car horses died on the streets in harness, and at all times a large veterinary staff was maintained to keep the stock in condition for its duties. Moreover, the stables needed a large force of hostlers, shoers, and stablemen, as well as elaborate arrangements for the supply of feed and the removal of refuse.

It is not surprising that street railway managers were somewhat eager to break away from these conditions, but as late as 1890 there were nearly 15,000 horses engaged in hauling street cars in New York city alone. Allowing an average of 40 square feet to each horse, or a stall 9 by 4½ feet, these 15,000 horses occupied some 600,000 square feet of stall space in the stables. They were required to haul some 2,400 cars, an average of not less than 7 horses to each car, the number based on cars in actual use being somewhat larger.

As already noted, one of the first changes in the style of the street car was the adoption of the box form, with vertical and horizontal lines instead of the curves of the old stagecoach or the omnibus. The lower part of the sides of the omnibus were made concave in order to provide space for the large wheels, but the small wheels of the street cars could be put entirely under the body, so that the concave form was no longer necessary.

When the cable came in, requiring a car that would withstand the different strains and the heavier loads, the science of car building had to be studied again. Some idea of the changes necessary may be gained from the fact that even in one of the old-fashioned 16-foot cars as many as 1,300 pieces of wood were required. In the cable car, not only were heavier timbers needed for structural body work, but resort was made to iron and steel as a substitute for wood where a gain in strength would follow their employment. The adoption of electricity again made changes necessary in the car-building art, due to the fact that cars now carried their own self-propelling mechanism. In America neither the horse nor the cable developed for permanent use cars known as double-deckers, those in which the passengers may ride on the roof as well as within the car. In England the double deck car is almost universal. The outside seats permit of smoking, and are attractive for observation purposes. Women as well as men use them freely. In Paris, which is one of the very few cities on the continent of Europe where double deck cars are used, a lower fare is charged for outside seats. Possibly for climatic reasons the double deck car and the omnibus with outside seats have never been popular in the United States. There are, however, some sections of the country, such as the South and California,

where they could be easily adopted if the public desired. Some of the horse and automobile stages in New York have had outside seats, but the street cars have always been single deckers. Double deck cars have been tried in Washington, Pittsburg, Boston, and some other eastern cities, and also in Oakland and San Diego, Cal. It is obvious that in making provision for the upper deck the style and type of the construction must be greatly modified. In dealing with American practice it will be understood that single deckers are always referred to.

Before proceeding to the subject of electric street cars, it may be pointed out that the cable system introduced the trailer, a type of car which was previously unknown. With horses one car was all that the team could pull, but with cables, so long as the gripping mechanism under the grip car was strong enough to hold, and so long as there was power enough applied to the traveling cable in the conduit by the power plant, there was no reason why a train of cars could not be hauled. In this way the cable system developed both the grip car and the trail car. Toward the close of the cable era it was not an uncommon thing to see a grip car hauling three or four trailers, constituting a regular train like those running on steam railway tracks. The grip car constituted the locomotive, but being without the faculty of reversing its motion and direction in case of emergency, it could not stop its heavy train quickly, and serious collisions and accidents took place.

As with horse cars, the first cable cars, whether grip or trailer, were closed. The open cars for summer use came later. A further modification was found in the combination car, a part of which is open and the other part closed. A later improvement was the addition of what has become known as the vestibule, an inclosure occupying the front and rear platforms and affording shelter and protection to the drivers. One other fact to be noted in cable car development was the use of 8-wheel as well as the 4-wheel cars. The use of double the number of wheels and trucks made the car much more comfortable. But the running gear of a 4-wheel horse or trail car could hardly be regarded as a truck in the sense in which that term is applied to the appliances upon which the body of the mechanically propelled cars is mounted. The self-contained motor truck may be said to have come into use with the advent of electric traction.

First electric cars.—The earlier forms of electric car bodies and trucks adopted in the United States must be regarded as no less experimental than were the motors and other features of electric traction upon which the success of the art depended two decades ago. Hardly a car existed at that time built specifically for electrical work, an old horse car, or possibly a cable car, being usually put into shape to receive the electrical apparatus. There was no agreement as to whether the motor should be put under the car or on the front platform, or in the

middle of the floor of the car itself, and the arrangements for the overhead trolley connections were equally indefinite. Nevertheless, it was out of the early and confused attempts at construction that the present forms appeared.

Along with the improvements in the forms of motors and methods of motor gearing, as well as in the overhead appliances, went experiments and improvements in the car bodies and car trucks. In the beginning there was the primitive single truck, and 5 or 7 ton cars, and now there are the long double-truck cars, equipped with 4 motors each, and weighing 20 tons. For some time the single motor trucks with 16-foot, 18-foot, and 20-foot cars persisted, but double-truck cars, from 30 to 40 feet in length, were later generally adopted as a standard in cities of any considerable size. The separation of trucks from the car body also brought into existence a new class of manufacturers, devoting their energies particularly to truck construction. The truck itself began to take on the girder form; some of the manufacturers built a special type of pressed steel frame, and others introduced cantilever principle.

It was soon found that the horizontal and vertical stresses in an electric car were very different in ratio and intensity from those experienced in a steam locomotive. The locomotive hauls a heavy load, its own propulsion being merely incidental, while the electric car has to propel itself with a heavy load on board, and only occasionally does it have a light trailer attached. Hence, the locomotive has been given a high degree of lateral as well as vertical stiffness. According to Mr. Edgar Peckham, whose name is closely identified with the subject, riveted cantilever truck frames were furnished to the Brooklyn City Railway, of Brooklyn, N. Y., in 1892, for use under 20-foot closed cars having an over all length of 28 feet. These were the first electric cars built of that length, and it was questioned whether a single truck with a 7-foot wheel base could support such a car body. As the result of the trial with the cantilever truck at that time, over 1,200 were supplied to the road in 1893, 1894, and 1895. These remained in use for several years afterwards without loosening their rivets, and thus demonstrated the ability of the cantilever truck to carry its load successfully under severe conditions.

The other general type of truck is that known as the Brill solid or wrought forge frame, which embodies the application of an opposite principle. This has also enjoyed a large amount of patronage from street railway companies. At the present time the practice is still more or less divergent in this respect, some makers forging the side frames of the truck and welding the whole together into one piece, while others adhere to the bridge-and-truss plan and build up what may be called an assembled truck. The disposition of springs under the truck to support the weight of the car varies greatly among different builders, but the results aimed at are



TRUCK FOR HEAVY DOUBLE TRUCK TROLLEY CAR



MAXIMUM TRACTION TRUCK.

and the platform and a rise from the platform to the car. In this last respect the car was an innovation, scarcely a car of this type and size having previously been known which possessed so low a platform and in which only one step was needed between the platform and the ground. The latest type of city car built in Milwaukee upon these lines is 41 feet long over the bumpers. Double side sills allow the sash to be lowered between them, and the window sills are made a little lower than usual, so that the car is practically an open one when the windows are lowered in summer. Owing to the narrowness of the bridges that the cars have to cross, protective wire netting is placed at each window opening in summer.

The combination type of car, half of which is closed and half open, is said to have had its origin on the Pacific coast, where it is still in use. The earlier types of combination cars on the United Railroads of San Francisco had longitudinal seats in the open section, facing outward, a feature which is quite unusual except in observation cars, such as may be found along what are called scenic routes. Such cars are found, for example, in the Niagara gorge, with seats facing toward the water. The newer cars in San Francisco have cross seats in the open parts, with center aisles, the closed part, occupying the middle of the car, having side seats, and being entered from either end. The motorman or brakeman is stationed in the center aisle of the front open portion. The newer cars are 39½ feet over all, have a seating capacity of 44, and weigh 33,500 pounds.

In St. Louis, Mo., the semiconvertible car was first tried on a large scale, and almost all the street railway lines were equipped with this type. The latest cars ordered for St. Louis, to handle the World's Fair traffic, are of the semiconvertible type, suitable for use the year round. They are 44 feet 8 inches over all, with a body 33 feet 4 inches, mounted on center-swivel short-wheel-base trucks, carrying two motors on each truck. They are box shaped, without curves, being 9 feet in width both at the sill and at the belt rail. Channel irons serve as side sills and form the principal part of the car bottom. The platforms are of unequal size, the cars not being double-enders in the ordinary sense of the word. The front platform, 3½ feet long, is for the motorman, and for entrance and exit to the car, but not for passengers. The rear platform is 7 feet long and in three divisions, separated by hand rails. The division next to the door is intended to be kept clear for the entrance and exit of passengers, and the other two are for passengers, the hand rail furnishing a support to those standing on the platform, very much as the car straps do to those standing up inside the car. There is an opening in the railing at one point providing a standing place for the conductor. This is a modification of what is known as the Detroit platform referred to under the description of the Detroit cars. The seating capacity of these cars is 50 passengers. Another

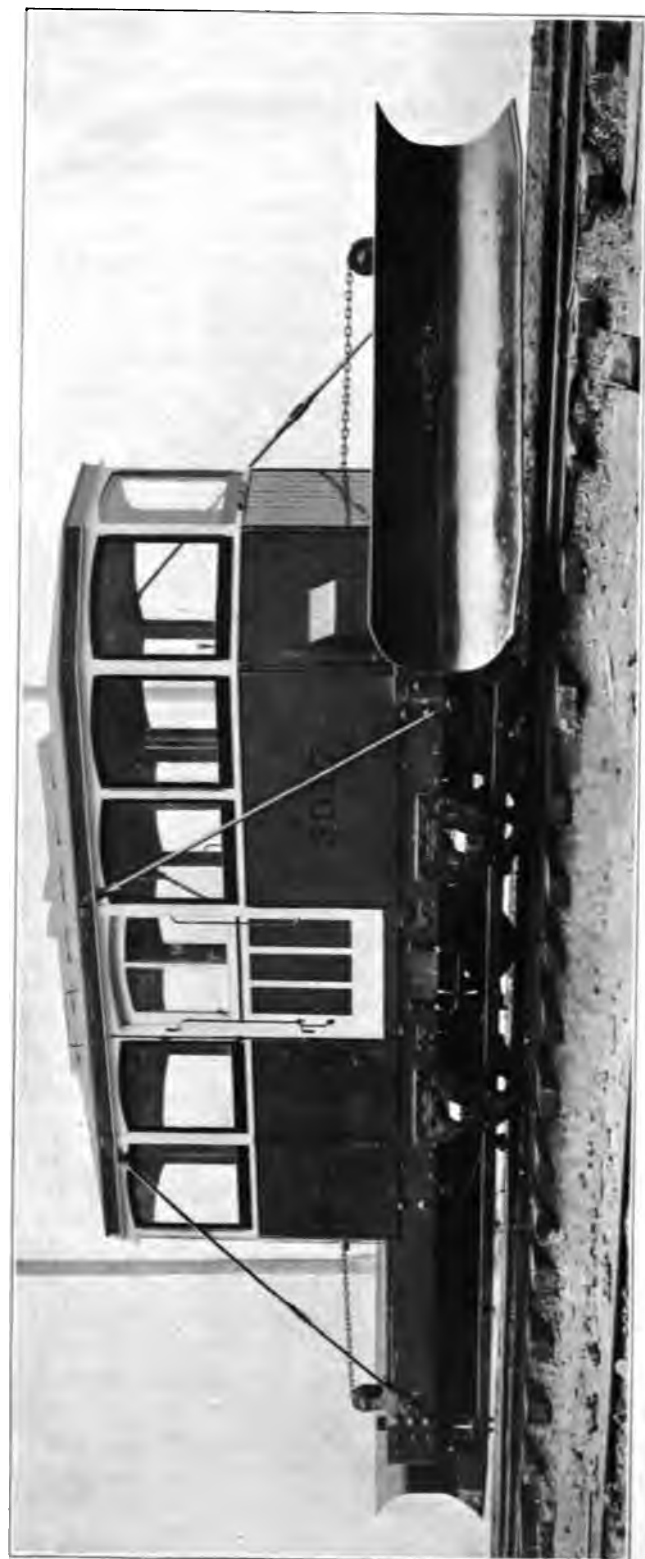
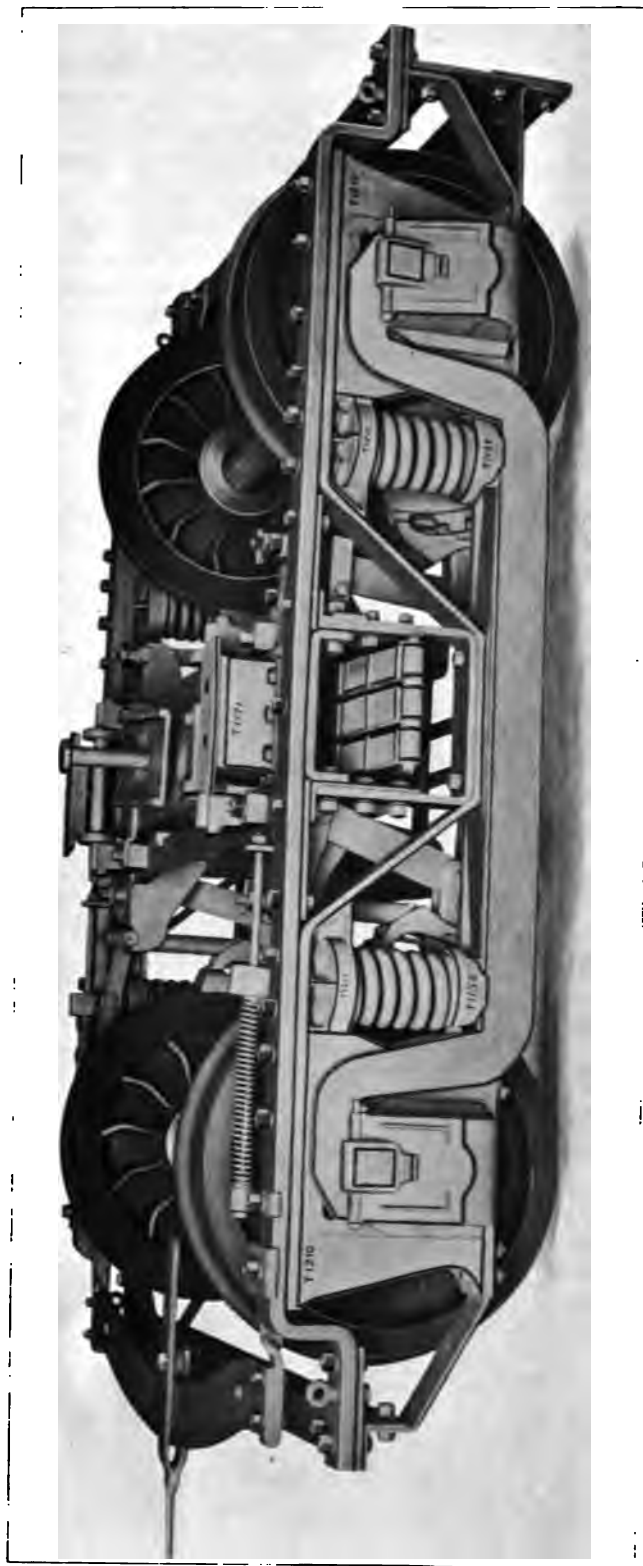
feature in St. Louis has been the introduction of a summer car which is practically without a roof. It has simply an awning as a protection against the weather, but this awning is usually kept rolled up so as to offer no obstruction to the free circulation of air. This car seats 96 persons, and in the warm, sultry evenings enjoys a large and grateful patronage.

In Philadelphia, Pa., the car last adopted as a standard is of the semiconvertible type, 38 feet over all, with 28-foot body, seating 40 passengers, and weighing, without load, 32,000 pounds. The body is so low that only one 13-inch step is needed to reach the platform, with an 8-inch rise from the platform to the car floor. Philadelphia adhered for a long time to the ordinary closed type of car with longitudinal seats, but the last 600 cars have been built with cross seats.

In Pittsburg, Pa., there are three types of cars in use, a single-truck open car, a single-truck closed car, and a double-truck closed car. The company uses trailers to some extent, with open cars, but is unable to use double-truck open cars on account of the narrowness of the streets. The latest double-truck closed cars are 42 feet 8 inches over all, with 30-foot bodies not less than 8 feet 6 inches wide at the sills, with straight sides and equipped with side seats. The single-truck closed cars have an over all length of 30 feet, being equipped with side seats and are somewhat narrower than the double-truck cars. The single-truck open cars are 24 feet 3 inches over all, 7 feet 10 inches wide, and fitted with 22 cross benches.

In Indianapolis, Ind., because of the heavy summer traffic, the open car is used to such an extent that it is a question whether it will ever be superseded by the semiconvertible type. A large number of these open cars are on single trucks, are 34 feet 5 inches in length over all, and have 12 benches seating 60 persons. The standard double-truck semiconvertible car employed on the system has a length over all of 45 feet and a body length of 32 feet, with a 6-foot rear platform. The front platform is occupied by a motorman's cab, which is so arranged that passengers can enter and leave the car by the front platform without interfering with the motorman. Part of the car seats are cross benches and part are longitudinal, and the seating capacity is 52 passengers. The car body is entirely straight in its lines, and the paneling is of sheet steel instead of wood which is the usual material.

In Detroit, Mich., a number of the open cars on single trucks have remained in use, but the later type is semiconvertible, with a center aisle and cross seats, the length of the car over all being 41 feet and the seating capacity 43 passengers. The front platform is 5 feet 6 inches, with a passenger entrance and a separate compartment, for the motorman, provided with a hot air heater. The rear platform is 6 feet 6 inches long, with provision for considerable standing room. It is what has become known as the Detroit type, the passenger



entrance being divided from the rear part of the platform, which limits the standing passengers by means of an iron or brass rail carried completely across the platform. This type of platform is in use in other cities, although sometimes modified, as in the St. Louis cars already mentioned.

The city of Denver, Colo., has a car which is quite different from that usually found either on the Pacific slope or in the East. It is 41 feet 6 inches over all, with a width of 8 feet 2 inches at the belt rail. It has no rear platform, as platforms are usually constructed, but has a platform or landing at the middle of the car, the entrance being at the side between two compartments. The front compartment is a closed one for nonsmokers, equipped with cross benches, and can be converted into an open car in summer by lowering the windows. The rear compartment is for more general use and has an open compartment for smokers. The side entrance and exit has the advantage that it can be more easily watched by the conductor, and that it can not be blocked by standing passengers, as can the platform. The seating capacity of the car is 48 passengers. There are two steps from the ground to the car, and it can be entered from the motorman's vestibule as well as from the side. It is well adapted to the variable climate of Denver.

A good illustration of the latest car construction in the South is to be seen at Atlanta, Ga., in the semiconvertible car of the Georgia Railway and Electric Company. On this car the lower side panels serve as sill plates, which, besides stiffening the side and giving longitudinal strength, provide a guard against injury to the car from collision with vehicles. It has straight sides, but the guard rail, and the division of the upper and lower panels give it a curved appearance, which is more graceful than that of the vertical box form. The sills are unusually low, bringing the top of the window sills only 24 inches above the bottom of the car. The windows are protected by three bar outer guards extending from corner post to corner post. The windows are stored in wood pockets in the manner often used in this type of car, and can be raised either full length or only part way. The car has a 4-wheel single truck base, and is 30 feet 8 inches long over crown pieces, and 7 feet 10½ inches wide over the sills.

The accompanying view of the interior of a semiconvertible car corresponds in general to the descriptions which have been given of cars of this type. There are, of course, numerous variations, embodying the ideas of manufacturers or street railway managers.

From the data which has been given, a general idea may be formed of the practice in the large cities of the United States with regard to the leading features of car construction. It will be seen that the semiconvertible car, adapting itself to city use for both summer and winter, during all weathers, has come into general use, although closed box cars with longitudinal seats for winter and open cars with cross benches for

summer, are still the standard in New York city, Boston, Baltimore, Pittsburg, Cleveland, and Buffalo. Even in cities like New Orleans and Kansas City, where the milder climate might be expected to make open cars more popular, the semiconvertible car has been introduced. As a matter of fact, it has been the practice in New Orleans to use closed cars throughout the year, the severe thunderstorms which break over the city so frequently and so unexpectedly during the summer months preventing the abandonment of this type even during the warmest weather.

The semiconvertible car is in favor with the managers of street railways because it avoids investment in a double set of car bodies and the necessity of changing from summer to winter equipment, and it is also in favor with the public. Although it is not so open as the open type of car, it is a better protection in case of bad weather, and the speed of the car insures an adequate circulation of air. Again, with an ordinary open car with running board along the side, the passengers can not quickly discover a vacant seat or change easily from one bench to another. It is, in fact, almost impossible for a woman to do this except while the car is standing still. But with the semiconvertible car and its center aisle, a change can be easily and safely made from one bench to another. Furthermore, exit and entrance at the end of the car, directly under the eye of the conductor, can be made with more safety. It would appear, moreover, that passengers as a general thing prefer cross benches, giving a view outside, rather than the longitudinal benches which face inward. The semiconvertible cars, however, do not appear to be equal to the strain of abnormal traffic, such as comes upon roads at holiday seasons, particularly in the summer time, and for this reason many of the roads retain open cars for such traffic because they can be packed to a much greater degree.

The length of cars has been greatly increased, but limits in this respect are found in the difficulty of rounding curves of short radius, where the streets are narrow, and the interference with other vehicular traffic. It is probable that a car which has a length over all of more than 48 feet has reached the reasonable limits for city service, for with the increase of length goes an enormous increase in weight. Some eight or ten years ago the average dead weight per passenger with single truck electric motor cars averaged about 600 pounds. It has now reached 800 pounds on many of the semiconvertible and closed cars, and in the newer long cars of the Chicago City Railway Company the weight is over 900 pounds.

The American street railway manager or car builder has very little to learn from European methods. In England the double-deck car is largely in use and very few single-deck cars are to be seen. The same is true of Paris, where the inside seats are reserved for first-class passengers at a higher rate of fare than is charged

the second-class passengers outside. The standard car for city service in Germany, Austria, Belgium, and in fact throughout nearly all of Europe, except in the city of Paris, is a single deck, single truck car, restricted in width and in over all dimensions, because of narrow streets and sharp curves, but with comparatively long platforms, to accord with the law which permits a certain limited number of passengers to stand on both platforms.

Double-truck cars with single decks are being introduced into certain cities with wide streets, as Berlin and Budapest. Open cars are used very little in any part of Europe, except in Italy, because of the uncertainty and dampness of the climate, the outside seats of the double deck cars, and the platform "places" of the single deck cars taking the place of the open car. The European practice of restricting the inside load of the car to the number of passengers who can be seated, is in part responsible for the large platform in the rear, already mentioned. Some of the platforms are 6 feet long, allowing standing room for 9 persons. Until quite recently the great majority of European cars have been of the 4-wheel type, 18 or 20 feet long in the body, with a seating capacity for 24 people, the shortness of the car giving the platforms an appearance of disproportion and clumsiness. In Germany the panels are sometimes made of sheet iron, but wood is largely in use. The lumber is to a considerable extent imported from America. The interior finish is, as a rule, not equal to that of the American street railway cars. Although Europe has its own car shops, and is now building more street railway cars than heretofore, there has been for half a century a steady demand from Europe, and other parts of the world, for American street cars and street railway trucks.

III.

ELEVATED RAILWAY CARS AND PRACTICE.

While the cars of all the elevated railway systems in the country are included in Table 95, it is not easy to determine the exact number that should be considered as exclusively designed and employed for elevated service. In Boston and Brooklyn, for example, elevated and surface railways are so connected as to make it difficult to segregate the figures accurately, as many of the cars are run on both surface and elevated tracks. In Brooklyn the situation is complicated by the fact that the Long Island Railroad connects with the Brooklyn Rapid Transit system soon after entering the city, so that a great many of the steam railway cars, operating over regular sections of road, become to all intents and purposes elevated cars, which can be handled either by steam or electricity. None of the statistics of the Long Island system, however, have been included in this report. This interdependence of the surface and elevated systems lessens the number of elevated cars proper.

The Boston Elevated system, which reported a total of 3,612 cars, had, apparently, but a year later, only 156 elevated motor cars, the total number being very much the same as that for the census year 1902. On the other hand in the following year the Brooklyn Rapid Transit system, with practically the same number of cars as the Boston Elevated system, and with almost exactly the same number of cars as in 1902, reported 781 of the distinctly elevated type. The details are clearer when one comes to the statistics of the New York system, where the Manhattan Elevated reported a total of 1,290 passenger cars. In Illinois the city of Chicago comprises several elevated systems operating under separate managements, or at least under distinctive designations, and these reported as follows: Metropolitan West Side Elevated, 361 cars; South Side Elevated, 212; Northwestern Elevated, 203; and Lake Street Elevated, 141, making a total of 917 cars, of which all but 15 were passenger cars. The figures for the four great elevated systems of New York, Chicago, Boston, and Brooklyn would, therefore, appear to have, with fair approximation, a total of 3,144 cars of the specifically elevated type proper, but, as already pointed out, this would not by any means include the cars actually plying over elevated tracks.

The cars of the elevated street railways proper are necessarily different in many respects from those provided for surface traction, and this is true, although the methods of operation may be practically the same. There is obviously no necessity of employing an under-running trolley conduit system with electric traction on an elevated structure, and the choice is left between the overhead trolley and the third rail. For standard elevated railway work in the United States the third rail has been universally adopted, although it may still be considered an open question whether in the long run resort may not be made in some instances to the overhead wire. The winter experience in such cities as Chicago and New York, when traffic has been interrupted by the formation of sleet on the third rail and the occasional accidents from third-rail contact and short circuits, have indicated some of the difficulties attending this method of operation.

The Manhattan Elevated road, operated by electricity, may be taken as an example of elevated railway operation and the cars of this system studied in detail. The company had at the end of 1902, 1,268 closed cars and 22 open cars, and was then adding more open cars for summer use. The practice of the Manhattan Company has been to operate these cars in 6-car trains, employing the multiple unit system. The motor cars have a length of body over the end plates of 47 feet 1 inch, and an extra width over the eaves of 8 feet 9.5 inches with a height of car from the top of the rail to the top of the dome of 12 feet 10.5 inches. The cars are electrically lighted and heated and have longitudinal benches with central cross benches. The motorman's



PRIMITIVE TYPE OF UNDER-CAR TROLLEY OR CONDUIT CONTACT, CLEVELAND, OHIO.



INTERIOR OF A "SEMICONVERTIBLE" CAR.

cab was designed by the company's engineer. When used as a cab it is cut off from the rest of the car by means of a glass door, and a roomy, box-like inclosure is thus formed in which the motorman can sit undisturbed and secure an unobstructed view of the track in front of him. When the compartment is not needed for motive purposes the motorman's seat is turned down, the door is folded back so as to protect the controlling apparatus, and a compartment is provided with seats for two passengers. A compartment is placed at both ends of the car so that either end can be occupied by the motorman.

The cars are built of wood, the underframe consisting of long-leaf yellow pine and white oak. Iron rods are used for strengthening the frame, and the roof of the car is supported by five principal car lines made up of 1.5-inch wrought iron bars, forged to the shape of the roof, and sandwiched between two white ash car lines bolted together. The motor and platform are supported by rolled open-hearth steel I-beams and channel beams. The trucks are of the swing bolster type with a 6-foot wheel base, the frame being rectangular and built up of angle iron. The bolsters are open-hearth steel plates and the pedestals for the journal boxes are of cast steel, with equalizing bars of steel 1 by 6 inches in section. The journal boxes are of malleable iron with brasses of phosphor-bronze lined with babbitt. The weight of a motor car with equipment complete is 51,800 pounds and the motor trucks complete with gears, but without motors, weigh 10,100 pounds. Each motor complete with gears weighs 4,420 pounds. The trailer trucks weigh 7,000 pounds each. Each motor car is equipped with two motors of 125 horsepower, both of which are mounted on the same truck, and all the motors of the train are manipulated together by means of the multiple unit control system, which is discussed on page 200 of the following section. The cars are lighted by 25 lamps of 16 candlepower each, set in the sides and ceiling, with 5 additional lamps at each end of the car for headlight, markers, and cab lights.

The cars are heated electrically, the heaters being in three circuits. Each heater has exactly similar coils and each circuit takes approximately 8 amperes of current, so that in very cold weather 24 amperes of current can be used to heat each car. The three circuits are numbered, and during the winter signals are posted at the terminals of the road under the direction of the superintendent telling the conductors what heating switches to throw in. These switches of the break-lever order are mounted in a sheet-iron box at one end of the car, the lighting switches being similarly mounted at the other end. The cars are equipped with the automatic air brake and the engineer's valve operated by a separate motor compressor under each car, which cuts in and compresses whenever the pressure

in the main reservoir drops below a predetermined amount.

Open cars have been introduced on the Manhattan system since electricity was adopted, the annoyance from smoke and ashes making their employment impossible so long as steam was used. They are 47 feet 1 inch in length and 8 feet 6 inches wide over the side sills. All the seats, with the exception of the end one, have reversible backs, and all the doors of the car at the side are opened at once by a lever operating from the end platform. In this manner a more expeditious loading and somewhat quicker emptying of the cars is obtained, as contrasted with the slower results due to the use of one door only at each end of the car, or as compared even with the cars on the Brooklyn Bridge, where there are large doors also at the center of the car. The total weight of the open car is 29,400 pounds.

The question of fire on elevated street railway cars has always been a serious one, owing to the great difficulty experienced by passengers in leaving the cars in case of accident, and the difficulty in reaching the tracks with fire extinguishing apparatus. Serious efforts have recently been made to improve the fireproof qualities of the cars. On the Manhattan Elevated the bottoms of the cars have been covered with asbestos sheeting, and asbestos cloth tape 3 inches wide has been wrapped about the cables. The motor ends of the car have been incased in sheet iron and covered with asbestos. The New England Insurance Exchange and other insurance bodies have shown a tendency to insist that wires shall be incased in metal tubes in all electric cars, thus making the wiring uniform in method with house wiring. The Manhattan Elevated Company has adopted a type of car fuse which produces little noise or smoke. It consists of thin copper ribbon with a hole drilled in the center. All the copper that is burned away in case the fuse "blows" is practically vaporized. The good results obtained are due to the large radiating surface in comparison with the small amount of metal in the fuse.

The frequent and disastrous fires occurring recently in the underground railroad of Paris, due to short circuit on the cars and the subsequent creation of a large volume of suffocating smoke, have further directed attention to the importance of thoroughly fireproof and insulated cars on underground roads, of which the system in New York city, with the possible exception of the Boston subway, is the first example in America. The first cars adopted for the Rapid Transit Underground in New York city consist largely of wood, and every effort has been made to insure their fireproof qualities. The first floor is of maple, as that wood is slow to burn and does not carry flame; this rests on the sills. On top is a layer of one-eighth inch fine felting asbestos protection and then another floor of maple. All the timbers and the sides are covered one-fourth of an inch with asbestos board before any of the sheathing

below the floor is laid. There are four sheets of quarter-inch steel above the motors, and the motor wires and control wires are all carried in asbestos conduits. On each cable are layers of asbestos insulation, and the sides of the cars from the floors to the windows are covered with copper sheets. The lighting and heating circuits are carried in asbestos conduits, and all the wooden frame is painted with fireproof paint. An all-steel car has also been developed by the company and has proved so satisfactory that it is stated all future cars put in the subway will be of this type. Although slightly heavier, they have the advantage of absolute noncombustibility.

IV.

MOTOR AND CONTROLLER EQUIPMENT.

Of the 65,949 street railway cars of all kinds reported by roads operating entirely or in part by electric power, 50,699, or 76.9 per cent, were provided with electrical equipment. The leading states reporting cars with this class of equipment were: New York, 10,222; Massachusetts, 7,801; Pennsylvania, 6,450; Illinois, 3,315; and Ohio, 3,188.

The variations in the proportion of the total number of cars reported in each state as provided with electrical equipment is due to the use on some roads of trailers, which have no equipment of their own.

Early motors.—At the time that motors began to be employed in street railway operation, much still remained to be done to perfect the motor itself. The idea of magnetic permeability and the measurements connected with it were very imperfectly grasped. Proper lamination of the armature cores to prevent heating was little understood or practiced, ventilation of the motor had not been solved, and iron or steel castings of the proper magnetic permeability were not obtainable.

The matter of gearing required much thought and experiment. By improvements in design and construction, it was found possible to lessen the speed at which the armature of the motor ran, thus doing away with the necessity for one set of gearing between the armature and the car axle. One commutator on the motor was found to give trouble enough without resorting to the use of two, and it was found desirable to discard all methods of gearing except spur gearing, which could be inclosed in a gear case. In many of the earlier motor constructions other methods of driving were tried, including friction pulleys, ropes and belting, worm gearing, connecting rods, bevel gearing, and sprocket chains, but these have all been abandoned and spur gearing is now in general use.

The first machines of the prevalent modern type were those which were built ironclad, or so incased as to protect them from moisture and dirt, with single reduc-

tion spur gearing construction. These machines were generally from 20 to 25 horsepower. They were different from the motors used for other purposes, and from the early generating dynamos which were sometimes forced into service as motors on street railways. In some of the first attempts to operate street railways on the "series" system a form of arc light dynamo was employed, and in some of the first attempts to operate on what is known as the "multiple" or "parallel" system low-voltage dynamos used for incandescent lighting were tried. In neither case was the machine properly adapted to such work. The early employment of the double reduction gearing between the armature and the car axle was necessitated largely by this use of electric lighting dynamos with their bipolar form of field construction. With the introduction of the multipolar machine came a reduction in armature speed, which made it possible to dispense with one set of gears.

Among the early problems in connection with the equipment of cars with electric motors was the proper location of the motor in the car. It was shifted from the floor of the car to the front platform and then back to the car, and was finally placed underneath the car. Many earlier cars had the motor hung under the car body with one end suspended by springs and the other hung on the car axle. This was but a temporary stage in which the old horse cars were remodeled to meet the needs of electric traction. The car axle in such cases was lengthened to make room for the motor, and the floor of the car was strengthened to carry the additional weight imposed upon it. A serious objection to this plan, however, was found in the difficulty of getting at the motor for inspection and repairs.

It is the modern practice to attach the motor to the truck rather than to the car body and to treat the car body as one unit and the motor and truck as another. This not only permits the attachment and detachment of open and closed car bodies, but it makes the mounting, inspection, and repair operations much easier, besides adding to the comfort of the car.

The prevailing method at present is to mount the wheels and axles in a frame carrying two crossbars for the suspension of the motors, and heavy springs which receive the weight of the car body and deaden the jolt or oscillation. For some years electric cars of moderate length were equipped with one truck for the whole car, carrying the two motors, and such trucks with the motors geared to them are still in very general use on medium-sized or short cars. But, as the car body has grown in length, one truck has proved insufficient to support the car and carry the motor equipment. The standard practice now is to use two trucks well separated from each other. For high-speed work and sometimes for city service, as will be described later, four motors per car are used, one geared to each axle. Where two motors per car are used, both are sometimes placed on one truck, though the practice differs. In some cities max-



HEAVIEST AMERICAN STREET CARS, ON STREETS OF CHICAGO.



HEAVY CAR OF CHICAGO CITY RAILWAY SYSTEM.



imum traction trucks are used to keep the car body low. These trucks are so designed that one axle of the 4-wheel truck is equipped with larger wheels than the other. This axle carries nearly one-half of the weight of the car and has a single reduction motor geared to it. The other axle has no motor geared to it, and carries only weight enough to keep the wheels securely on the track.

Modern motors.—The motors in general use at the present time for street railway work are of the 4-pole, series-wound, ironclad type. One of the best known, which may be taken as a typical example, has a weight of 1,455 pounds for a rated capacity of 25 horsepower, with a weight of 715 pounds upon the axles to which it is attached. The advances shown in the construction of this machine may be inferred from the fact that a corresponding motor of the same capacity formerly weighed 2,395 pounds, while one of 15 horsepower weighed 1,735 pounds. It is completely incased, so as to be protected against dust and moisture. It is light enough to be lowered into the repair pit in the car barn, and the armature is so short that it can be taken up through the floor of the car by means of a trapdoor. It is hung from the truck in two ways. In the method known as "nose suspension" one end of the motor rests on the axle through its bearings and the other is hung by a crossbar and springs from the truck. In the other, or side bar suspension, there is a side frame resting on springs, carrying the motor by two lugs, one on either side, so placed that the motor is suspended in line with its center of gravity. The armature of this 4-pole machine is made both in the drum form and in the Gramme ring type. Two of the poles are used in connection with two field coils, the other two poles being arranged in a manner known as "consequent." The two field coils are wound on forms and wrapped with waterproof and fireproof material. All the bearings are lined with Babbitt metal and are freely lubricated. The speed reduction is 4.78 between the armature shaft and the car axle—that is, nearly five to one. On these motors, as on all other street railway motors, carbon brushes are used to bear upon the commutator of the armature, and connections between the commutator bars and the armature coils are made by short pieces of flexible cable, joined to the bars by solid cups, so constructed that breakage by vibrations or jolting is avoided.

Controllers.—In order that the action of the motor may be governed and varied, the coil terminals of the motor are brought out by cables to a "controller," or series of spring contacts, pressed against metal surfaces grouped on a vertical cylinder. These surfaces are so arranged and shaped that rotation of the cylinder produces the required combination for operating the two or more motors singly or together, by which the speed of the car is raised or lowered, and for reversing the direc-

tion of the car. As these controllers are on the platforms and exposed more or less to the weather, as well as to possible contact with passengers, the mechanism is inclosed in stout metallic casing, which can be easily removed for purposes of inspection. The top of the controller case consists of a brass cover, out of which projects the spindle of the cylinder, which connects with the controller handle. A second handle operates a second and smaller cylinder switch, used for reversing. There is a dial plate on the face of the controller which shows the position of the two cylinders.

The controller in general use is known as the "series parallel" type from the fact that the various degrees of speed and the amount of current consumed are regulated by connecting the motors in series and in parallel, in combination with the resistance which is carried under the car. This resistance consists either of a series of cast-iron girds or of sheet iron ribbons, generally insulated with mica, the ends of which are brought out to the controllers at either end of the car.

In the actual operation of the car the electric current passes from the trolley pole to the resistance, which is arranged so that it may be cut in or out, and thence to the motors, arranged either in series or in multiple, and thence to the wheels and the track, if the track, as is usually the case, constitutes the return circuit. If this is not the case, and double overhead wires are used, the current returns through a second trolley pole to the return circuit wire. With the controller handle in the first position, as indicated on the dial, the current passes through the resistance, losing in heat a certain portion of the normal pressure or line voltage of 550 volts. With pressure thus reduced the current reaches the motors, which are connected in series—that is, in tandem—and each gets half of the current and starts up slowly. The motorman, moving his lever across the face of the controller dial, cuts out the resistance by a new adjustment of the contacts of the controller. The motors are left in series, taking between them the full pressure of 550 volts. Each is thus getting 275 volts and moving at an appreciably faster rate of speed. At the next step the resistance is again cut in, but the motors, instead of being in tandem on the circuit, are now grouped in multiple or parallel. They both receive the same portion of current from the line and the same voltage, say, 400 volts. Under this voltage the armatures of the motors again revolve faster than before, with an increase in the speed of the car. The last or final position is "full speed ahead," the resistance being entirely cut out and the motors being left in parallel to receive full current and pressure from the line. The number of sections of a controller vary with the grouping of the motors and the division of the resistance. The contacts within the controller are connected with small electro-magnetic coils of wire, which serve as blow-outs for any sparking that occurs when

the circuit connections are brought into new groupings. Other safety devices employed are the fuse and the circuit breaker.

The fuse is a short piece of wire of German silver or flat copper of such size and capacity that it will readily be melted by a current strong enough to damage the motor, and the fuse, having a predetermined melting or fusing point, blows as soon as the current reaches the danger point. The melting of the fuse opens the circuit and cuts the current off from the motor. Sometimes the blowing of the fuse has been accompanied by fire, due to the creation of a heavy spark or arc at the points where the fuse metal is attached, but fuse boxes have been secured which are as nearly fireproof as possible, and the fuses themselves are inclosed in cartridge-like cases so as to stifle both fire and noise. The fuse box is usually placed under the car.

In place of or sometimes in addition to the fuse the cars are protected by what are known as circuit breakers, which perform practically the same function. The circuit breaker is a form of switch controlled by an electro-magnet and is usually placed under the roof of the car platform, where it is readily accessible. It is set to operate automatically at a higher current value than the fuse for the reason that the circuit breaker acts instantaneously, whereas there is an appreciable time required to heat and deflagrate the fuse. The circuit breaker opens the instant the current has reached the point at which it would become dangerous to the motor, and is especially serviceable in protecting the motor against sudden and heavy charges of current, while its use protects the motors against currents of lesser degree which would do them injury if allowed to continue for any length of time.

Number of motors per car.—It has thus far been assumed that two motors were sufficient to propel a street car. On interurban roads, however, and to some extent on elevated roads, a car with four motors has come into use, and the number of such cars is increasing. A number of comparative tests with 4-motor and 2-motor cars were made in 1901 by the Boston Elevated Railway. From the results obtained it did not consider the 4-motor as desirable as the 2-motor cars, all the conditions of service being taken into account. The company equipped one of its standard 25-foot box cars with four motors, which were so connected that each pair was brought in multiple to the controller. A car and truck were similarly equipped with two motors of the same kind. It was found that the 4-motor car took considerably more energy than the 2-motor car to cover the same distance. In one run the energy consumed, as measured by wattmeter in each car, was about 50 per cent greater, although the weight of the 4-motor car was only about 18 per cent greater than that of the 2-motor car. These tests were repeated, with the same motorman handling both cars instead of different men, so as to obtain the same

personal equation. The same general results were obtained. The 4-motor car could run at higher speed and carry more load than the 2-motor car. This would mean quicker running time if the tracks were cleared of the slower moving cars. But in view of the great number of cars operated, and the fact that the company was making as fast time as was safe or allowable, except in some places in the suburbs, the technical officials of the road concluded that the greater speed and carrying power of the 4-motor car would be purchased at too high a cost.

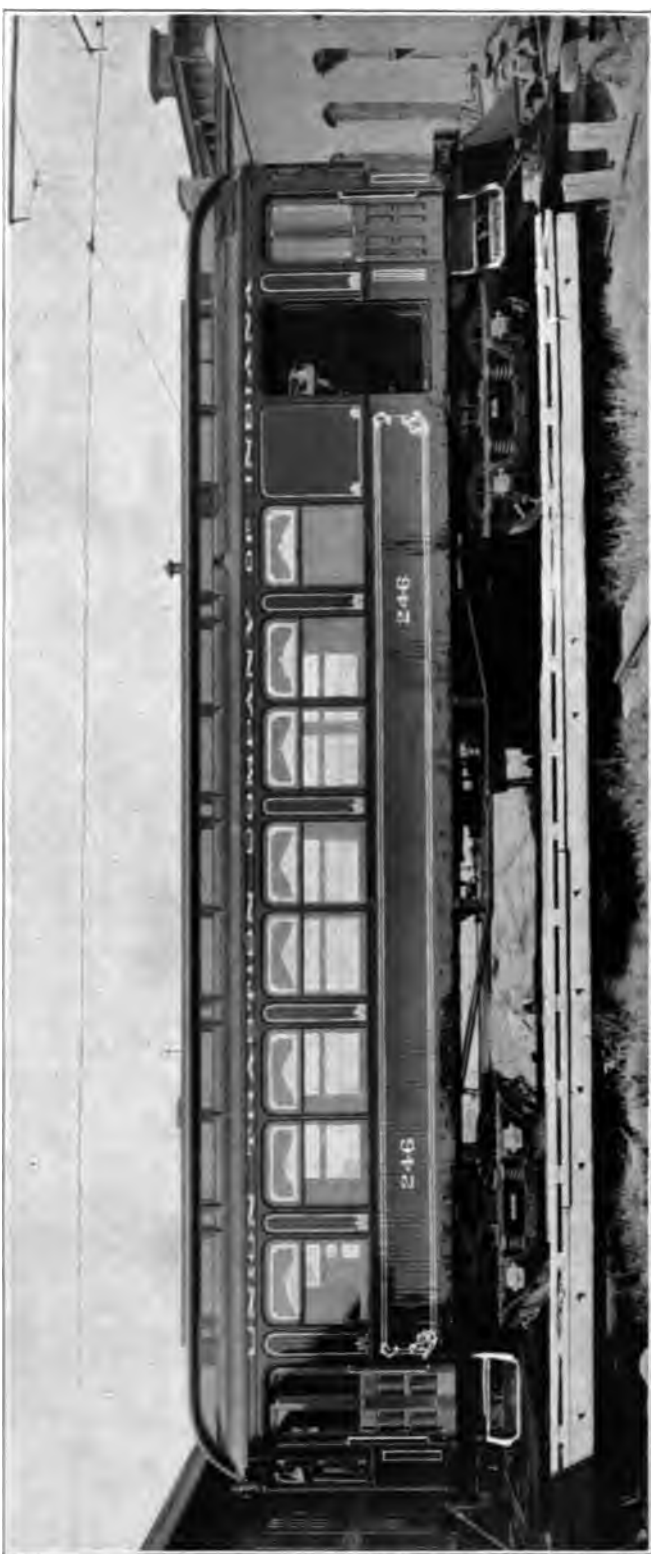
In one thing the 4-motor cars excelled, and that was in the traction. The entire weight of the car was available for adhesion and the drawbar pull was the maximum that could be obtained on any given rail. Traction on the 2-motor car, however, was improved by the use of maximum-traction trucks, in which a large proportion of the weight of the car is carried on the motor axles and very little on the trailer axles, and also by hanging the motors outside the axles instead of between them. This increased the percentage in weight available for traction from 66 to 74 per cent, and reduced to some extent the advantages of 4-motor trucks. An alternative to the use of large, long, and heavy 4-motor cars is to join the cars in trains. This practice is more feasible on an elevated road than on the surface, although there are some instances of the multiple train unit method on the surface lines.

Multiple unit system.—The advantage claimed for the operation of cars in trains of three and four cars, as in the Chicago cable system, rather than singly, is that when the headway is short there is an opportunity to operate more cars on a given length of track without interference. If a four-car train were cut up into four individual units, each traveling within the one minute headway, which prevails frequently for four-car trains, it would mean that the separate individual cars must be operated four to the minute, or at fifteen seconds headway. This is practically what is done on Broadway, New York city, with the electric cars, and at times the headway is even shorter than that. The success in the crowded city streets of Chicago of the four-car train has probably been due to the fact that, as a general thing, the streets in Chicago are unusually wide and straight, so that the other vehicular traffic is not so frequently congested. Whether trains take longer to load and unload than single cars is a disputed question.

Following the example of the cable railways, the elevated railroads of Chicago introduced the multiple unit plan of electric railway operation. This plan involved a different form of controlling equipment from that in use on single cars, so as to make it possible for a train of several cars to operate as a unit. The number of cars in the train might be varied throughout the day, according to the requirements of the traffic, and yet it was necessary to provide for the same speed, and the same quickness of stopping and starting for the largest train



INTERURBAN PASSENGER AND EXPRESS CAR, WILKESBARRE AND HAZLETON RAILWAY.



INTERURBAN CAR IN USE ON UNION TRACTION SYSTEM OF INDIANA.

as for the single car. In the spring of 1898 the South Side Elevated Railroad Company, of Chicago, was equipped for regular service with the first electric multiple unit train ever run, carrying out the ideas and inventions of Mr. Frank J. Sprague. Multiple unit trains of from two to six cars had been experimented with previously at Schenectady, N. Y., and a five-car train had also been tried on the tracks of the Metropolitan Elevated Railroad in Chicago. Since that time the system has been adopted in one form or another on the elevated railroads of New York city, of Brooklyn, and of Boston. Many hundred multiple unit motor cars and "train-line" cars are now in daily use on these systems. A requirement of the multiple unit system is an equipment which will allow the cars to be run in single units from either end of the car, or in any combination from two cars upwards, without regard to the sequence of cars, and with control at will from either end of any car in the combination. This system must be distinguished from the distributed motor control, in which the motors of each car would be handled by the controller of that car without any regard to uniformity and simultaneity of action. While a train could be composed of such motor cars there could be no assurance that the motors would work in harmony. The multiple unit idea involves the contrary principle of distributed motors under a train, subject to a common control, so that all the motors can be controlled simultaneously from a distance, and thus the united action of more motors than could possibly be concentrated on a single car can be secured, with resulting increase of traction and a scientific distribution of various strains. These motor cars, as well as the other cars without motors of their own, if provided with controlling "train lines," can be made up for a train in any combination, without regard to the number of cars or their order. Cars when thus collected into a train can be easily manipulated or controlled from one or more points in the train, usually the head of the train, by the moving of the master switch.

To illustrate the working of the multiple unit system one type of equipment of the Manhattan elevated line in New York city may be considered. The controller consists of two parts: First, a number of electrically operated switches, or contactors, on each car, which constitute the series parallel controller for the motors and vary the starting resistance in the circuit; second, two master controllers on each motor car, one located at either end of the car, either of which serves to control the contactors on that car and all others in the same train. A cable connected to the master controller and to the contactors runs the entire length of the train, and with suitable couplers makes necessary connections between the cars. The current does not pass through the master controller, nor, usually, through the train cable, these parts carrying only the currents which operate the contactors. Each motor car collects its own motor current

from the third rail and controls this current in its own contactors. The movement of any master controller sends current to the contactors, since these are wired in parallel to the train cable, thus causing simultaneous movements of all contactors in the train. The action of the motor controllers, or contactors, of all cars at the same time with the movement of the master controller handle insures similar resistance connections and motor combinations on all the cars. The operator knows by the position of the master controller handle the exact position of the contactors on all of the cars and the rate of movement of the contactors. Consequently, the amount of current taken by all of the motors is under his immediate control, just as it is with ordinary hand operated controllers. The motorman is able at will in an emergency to utilize immediately the full power of the motors in either direction.

In case the supply of power to the train is momentarily interrupted for any reason, the contactors all open the motor circuits, but the motor and resistance connections are instantly reset upon the restoration of power, provided the master controller position is unchanged. If the train breaks in two, the current is automatically and instantly cut off from the motors on that part of the train which is not under the control of the motorman, while his ability to control the front part of the train is not affected.

When the master controller is thrown off, both line and ground connections are cut off from the operating coils of the contactors, and none of the train wires, or any of the wires in the train line cable are "alive." To reverse the motors, the master controller is provided with a separate reversing handle, and a mechanical interlocking device prevents this reversing handle from being thrown unless the main handle is in the "off" position. A movement of this reverse handle either forward or back makes connections which throw an electrically operated reverse switch either "forward" or "reverse." This main reversing switch is electrically interlocked, so that it can not be thrown when power is "on." The operating circuit is so arranged that, unless the reverse switch on any car is thrown in the direction indicated by the master controller reverse handle in use, it will be impossible to operate the contactors so as to get any current in the motors on that particular car. A cut-out switch is provided on each car, so that in an emergency all of the contactors on that car may be disconnected from the control circuit. The control operating current at 550-volt line potential is about 2.5 amperes per car for an equipment of two 125-horsepower motors, and the total weight of the control apparatus for this equipment is approximately 2,200 pounds.

The master controller is similar to the ordinary street car controller in method of operation and appearance, although of considerably smaller dimensions. Separate handles for power and reverse are provided. All cur-

rent for the operation of the several motor controllers passes through the single master controller in use, which takes current directly from the line. A magnetic blow-out is provided, similar to that used on standard street car controllers. An automatic open-circuiting device is provided in the master controller, whereby, in case the motorman releases the master-controller handle in any "on" position, the control circuit to the motor controllers is instantly opened on auxiliary contacts. This result is obtained by mounting the operating mechanism for the auxiliary safety device loosely on the main shaft and providing it with a spring, which, when released, is returned to the "off" position without necessitating the movement of the entire cylinder or handle; thus the device is entirely separate and distinct in its action from the main cylinder.

The motor controller for each car consists of 13 electrically operated switches, called contactors, and an electrically operated reversing switch, which reverses the armature leads of the motors. Each contactor consists of a movable arm, carrying a finger, which makes contact with a fixed terminal finger, and a coil supplied with current from the master controller for moving the arm. The contactor is so designed that the motor circuit is closed only when current is flowing through the coil. Gravity, combined with spring action of the finger, causes the contactor to open as soon as the master controller circuit is interrupted. The contactor has an efficient and powerful magnetic blow-out. The different contactors are practically identical, and the few parts which are subject to burning and wear are so constructed as to be readily replaced.

The general design of the motor reversing switch or reverser is somewhat similar to the ordinary cylindrical reversing switch, with the addition of the electro-magnets which turn it to either the forward or the reverse position. The operating coils are similar to the ones used on the contactors.

The coupling between the cars consists of sockets and a short "jumper" cable, with a plug at either end. The sockets on the car contain a number of insulated metallic contacts, which are the terminals of the wires in the train line. This socket is shaped to receive the plug on the end of the cable. The plug contains the necessary insulated contacts to make the required connections, and is so shaped that it can be inserted into the socket in only one way, thus insuring the same series of connections each time two cars are coupled together. The couplers are provided with spring catches, which maintain contact under normal conditions, but permit them to be released immediately in case the train breaks in two. A special cable made up of different colored, individual, insulated wires is used whenever possible to make control circuit connections between the various pieces of apparatus, a similar cable being used for the connection between the coupler plugs.

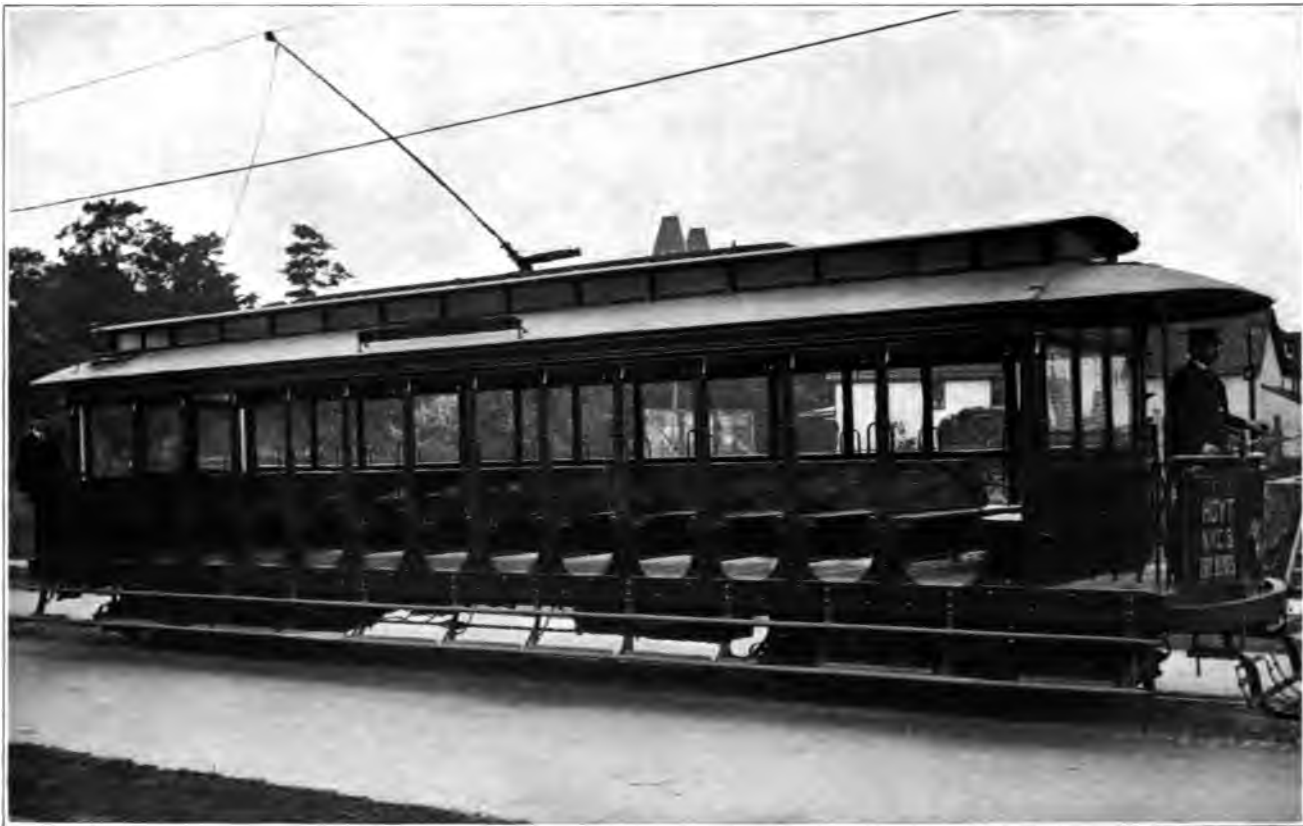
An important differentiation in some respects from

the apparatus thus described has been installed on the Brooklyn Rapid Transit Company's elevated system. The supply of current through the third rail, and that supplied through the connections of the low-voltage control circuits are the only sources of power which have to be considered in train operation. In this apparatus compressed air is used in connection with a set of storage batteries. Only seven battery wires are required for the train line or cable, so that the cable carries a pressure of only 14 volts. This dispenses with high-voltage wires on the train cars and high-voltage coupling everywhere on the system. The master controller and the air-brake operating valve are mounted on the inside end panel of the motorman's cab. The master controller handle is fitted with a spring return which makes it a "dead man's handle," it being so constructed that should the motorman remove his hand at any time from the controller handle, the brakes are at once applied automatically unless the reversing handle has first been turned to the center position. By similar mechanism, if the brakes are applied while the current is still on, the current is automatically cut off. This is accomplished when setting the brakes by means of a connection between the spring return handle and the air brake system, while the release of brakes is effected by a connection between the air brake system and a small air cylinder, the piston of which opens the storage battery circuit.

To insure uninterrupted service from the storage battery used in operating the electro-pneumatic switch, there are two sets of batteries of seven cells each, which, like every other part of the system, except the master controller and the battery switches, are carried beneath the car floor. The controller itself comprises 13 unit switches, arranged radially in the turret, and protected by a sliding cylindrical case. These individual switches are operated by pneumatic pistons controlled by electro-pneumatic valves, operating against a spring pressure of 70 pounds, so that a very decided motion is given to the circuit breaker. The 13 switches have a common magnetic blow-out coil, located at their center, of which the spider arms of the individual switches constitute the pole piece. The danger of the welding or sticking of the contact surfaces is avoided by the pressure of air against a spring. Moreover, the switch finger levers are made flexible, so that when drawn up by pneumatic pressure and released by spring pressure they produce a slight rubbing movement of the contact surface and help to prevent any possible welding. The reverse switch is of the usual type, with copper contacts operated by two air cylinders controlled by electro-pneumatic valves running from the reverse cylinder of the master controller. This reverse switch is placed as near the motor truck as possible to reduce the length of the wire, and beside it is the limit switch governing the speed. The total weight of the complete apparatus, inclusive of the battery, is over 1,700 pounds. All



INTERURBAN CAR ON CLEVELAND, ELYRIA AND WESTERN RAILWAY.



LONG TYPE OF OPEN CAR, IN USE AT BUFFALO, NEW YORK.

the circuits are run in electro-bestos conduits. The system has been constructed with the idea of securing absolute and instantaneous control, with the minimum liability to collision, fire, or other casualty. The vital importance of the car controllers justifies the immense amount of money and energy which has been expended in devising the modern systems. Brief reference to larger motors will be made in the chapter on interurban railway equipment.

V.

THE OVERHEAD TROLLEY CONTACT.

The devices for conducting the current from overhead wires into the cars are details which could not at any stage of the development be considered independently, but had to be developed in relation to the methods of suspending overhead wires and of employing the overhead frogs and switches along which the contacting device has to travel. Some of the earlier trolley devices traveled along the top of the wire, but this was soon found to be an inconvenient and inexpedient method. The overhead devices for making a side contact were also found impracticable, as, for example, those used on the electric road at Offenbach, Germany, where a split tube was employed, at the side of the road, the contact device sliding along inside the tube.

Instances of the early style of overrunning trolley in this country and Canada were due to Mr. Van Depoele, and one or two of them were in use until recent years; for example, at St. Catherines, Canada, where one form employed was exactly like the underrunning trolley, but had a heavy weight attached to a cord to steady it in position on the wire. Such overrunning contact devices were connected with the cars by flexible cords, and when cars passed the cords were exchanged or one of them was lifted from the wire by the car conductor by means of a long wooden fork, kept on the car for that purpose. As soon as resort was had to the trolley wheel pressing upward under the wire (the underrunning contact), it became necessary to employ a pole extending upward from the car roof to hold the wheel firmly in position, and in this manner, through a variety of forms of pole, base, and swiveling mechanism, was evolved the modern trolley seen on top of all such cars in the United States. The trolley pole now used is of tubular steel. The trolley wheels are usually of fairly hard copper. The pressure of the trolley wheel against the contact wire is from 16 to 20 pounds, depending upon the style of the wheel; and the wheel itself, which is from $4\frac{1}{2}$ to 6 inches in diameter, weighs from 3 to $4\frac{1}{2}$ pounds. The average life of the lighter wheel is 5,000 to 8,000 miles, the wheel taking up the wear rather than the wire; but the 6-inch wheels have been known to endure for from 12,000 to 15,000 miles. Precautions are now taken to prevent the pole swinging around and doing damage to the overhead construction when the trolley wheel by accident leaves the wire.

For this purpose devices known as trolley retrievers and trolley catchers are employed. The retriever is so constructed that it pulls the trolley pole down clear of all the wires as soon as the wheel leaves the trolley wire. It is usual to have a rope, attached to the trolley pole, by means of which the conductor or motorman can adjust the trolley pole from time to time as may be required.

VI.

BRAKES.

The statistics regarding the extent to which different kinds of brakes have been installed on street railway cars, included in Table 95, show that 63,690 cars, or 95.4 per cent of the aggregate number, were reported as equipped with hand brakes, and 7,905, or 11.8 per cent, with air brakes, including those in which the air pumps are driven by electric motors, and 5,148, or 7.7 per cent, with other varieties of mechanical brakes. It is of course evident from these figures that many cars are provided with brakes of more than one kind.

The detailed statistics show a very general distribution of hand braked cars. In New York state, for example, all but 5 of the 96 companies reported that they had at least some cars equipped with hand brakes. Out of a total of 14,040 cars reported for the state 13,805 were equipped with hand brakes. The same conditions prevailed in Pennsylvania where 6,972 out of 7,058 cars had hand brakes; in Massachusetts where 8,274 out of 8,310; in Illinois where 5,790 out of 7,778; and in California where 2,016 out of 2,056 cars were reported with hand brakes.

The air braked cars were more generally distributed than might perhaps be expected, cars of this character being reported from all the states except Arizona, Arkansas, District of Columbia, Idaho, Kansas, Mississippi, Nebraska, New Mexico, and South Dakota. The great majority of these cars, however, were reported from a few of the principal states—1,529 from Illinois, 1,207 from Massachusetts, 2,070 from New York, 445 from Ohio, and 1,064 from Pennsylvania. Of the number in these states, again the majority were reported by the larger city systems, as, for example, New York city, Brooklyn, Chicago, Boston, and Philadelphia. The Metropolitan or Interurban system in New York city reported every one of its cars as hand braked, so that the large figures in that area are in reality those of the Manhattan Elevated, with 1,331 cars.

In all of the earlier cars the brake applied to the wheels was invariably that operated by a hand lever. The brake handle was connected by a chain and a system of levers with brake "shoes" on the wheels, the handle usually moving 25 inches for a quarter-inch movement of the shoes, so that with 2 inches slack in the chain the handle would have to make nearly two revolutions, in addition to the revolutions required for taking up the slack, before the shoe was brought against the face

of the wheel. This brake had the advantage of putting little strain upon the driver and the horses, but owing to its rather slow operation it resulted in "flatting" the wheels, which was a source of great annoyance to the company and discomfort to the passengers. Some brakes, called track brakes, are operated by being pressed against the rail. The introduction of what are generally known as mechanical brakes has lessened the amount of "skidding" and the wear and tear of the wheels, and has given the driver a more instant control of his car. Indeed, it would probably be impossible to operate the heavy cars of modern type without the powerful mechanical brakes which are now employed. It is estimated that with modern braking methods brake shoes should last about 5,000 car miles, and the usual chilled iron wheels 35,000 car miles, without renewal. An average brake shoe of 21 pounds is allowed to remain in use until the block has had a wear of some 10 or 12 pounds. These are average figures, the actual figures varying greatly in practice. The power from the power brake handle is conveyed to the shoe by a variety of forms of rigging. In one form of momentum friction brake the brake staff, instead of directly transmitting the power necessary to pull the brake shoe up against the wheels, is connected through the brake chain to the drum sleeve of one of the axles. This drum is not keyed to the axle and does not turn with it except when a stop is to be made. When it is desired to stop the car the edge of the drum, which is in the form of a disk, is pressed by a series of levers against a corresponding disk on the inside of the car wheel, a leather washer being placed between the two disks in order to take up the wear. The friction due to the pressure of the drum against the car wheel causes the drum to revolve, thus winding up the chain and setting the brake.

As is shown by the statistics a large number of modern street cars is equipped with air brakes or electric and magnetic brakes. In the city railways in the Eastern states, where short cars have been largely retained on account of narrow and crooked streets, hand brakes are common, while with long or high-speed cars air or other power brakes are almost universal. The supply of air is usually produced by independent motor compressors carried on the individual cars, but in a few cases central compressor plants driven by steam or by electric motors have been installed. Where this is done the car reservoir carries a reserve storage supply of air at 300 pounds pressure and a working supply at from 20 to 50 pounds pressure, the amount depending mainly upon the weight and speed of the car. An average of 500 stops may be made on one charge.

Where the compressor is carried on the car, it is usually driven by an independent motor provided with an automatic switch, which is so acted upon by the air pressure in the reservoir that it throws the motor in and out of operation as the pressure in the reservoir falls

and rises. In another type the compressor pump is geared to one of the car axles in such a way that the revolutions of the axle of the moving car supply power to work the pumps. When the reservoir is fully charged the gearing is released and the pump stops acting.

In one system of electro-magnetic braking a circular electro-magnetic brake shoe is rendered magnetic by the current from the motors in such a way that it is drawn powerfully against the face of a disk on the car axle. This brake serves for emergency stops as well as for all service stops, but up to the present time it has not been widely used. Another system of electro-magnetic braking includes a double or split track shoe of novel construction, combined with a powerful electro-magnet. The magnet, when energized by a current from the car motor, acting temporarily as a generator, brakes the car by being strongly attracted to the rails over which the car is passing. Lever connections may also be established between the electro-magnetic brake shoe system and the wheel brake shoes, so that when the track shoes are set the magnetic brakes are also set against the wheels, the effect being so adjusted and graduated that no greater brake pressure can be applied to the wheels than they can withstand without skidding.

The Pittsburg Railways Company has adopted magnetic brakes for open and closed cars, while the United Railroads of San Francisco on combination cars, which operate on the steep grades of that city, employ straight air, wheel, and track brakes.

The subject of brakes has been considered carefully by the authorities in various states and communities, with the object of lessening the number of accidents, which might be avoided if the cars were under better control. The board of railroad commissioners of the state of New York in 1899 authorized a public competitive test of brakes for surface cars. The commission issued a notice of the test to owners of brakes for surface cars, in response to which 26 applications were received, all of which, with one exception, were accepted by the commission.

Elaborate methods of testing were devised, and on each car 14 average speed records were taken—3 at 8 miles per hour, 3 at 12 miles, 3 at 15 miles, 3 at 16 miles, and 2 at 16 miles with sand. It had been the intention to carry the tests to higher speeds, but these did not prove feasible with the motor equipment used. The record of the tests made by the commission constituted an elaborate report. On the basis of the tests the board decided that except in special cases, where the liability to accident is very remote, the ordinary single chain and spindle hand brakes then and still generally used should be replaced by some one of the mechanical or power brakes which were submitted and tested. The board did not recommend any particular brake for any class of service, but left the selection to the judgment of the railroad officials themselves, reserving the right to exercise fully

its power under the law to require of the companies the use of sufficient and safe equipment for the public service.

The tests related not only to the average length of track covered before the stop was effected by each brake at the different rates of speed, and to the skidding of wheels, but also to the reliability and simplicity of the system, the liability of the brakes to act when they should not do so, the ease with which the brake could be operated by an ordinary motorman, and the cost of equipment and maintenance. First in the order of worth was an electric brake. This brake, operated by the trolley current, consisted of a series of magnets with armatures at varying distances, mounted loosely on the same rod, and placed in such a way that the attraction of the armature nearest to the core carried with it the armature next in distance from the core to a point of greater magnetization, and so on, each armature acting upon the next and thus creating a long and powerful pull. The rod upon which these armatures were arranged formed part of the ordinary brake rod, and the brake could be applied to the ordinary spindle hand brake. The movement of the brake handle set the electric brake in operation, but this could be done without interference from the electrical portion of the brake, so that in case of failure or interruption of current the brake could be set by hand. The hand brake being naturally under test at all times when the electric brake was in use, its working condition was insured in case of some failure of current from the trolley line. The device took but 5 amperes of current. With the cars under test this brake made a stop, for all speeds, in an average distance of 58.83 feet. At 16 miles an hour on ordinary track the cars stopped in 72.33 feet in 9.35 seconds, and at a speed of 16 miles an hour with sanded track in 73.08 feet and in 8.92 seconds. The brake which ran closest to this in the tests was the momentum friction brake, the friction device being placed on one of the axles of the car. This brake showed stops at all speeds in an average distance of 66.71 feet. It can not be said, however, that any great weight has been attached to these tests.

Aside from or in addition to the brakes there are other parts of the operating construction which are in universal use. One of these is the gong operated by the pressure of the motorman's foot, and sounding its warning insistently in crowded streets. Another device upon or within the car itself is the safety gate, with which motor cars in some cities have been equipped, as, for example, at Minneapolis and St. Paul, Minn. This gate being under the control of the motorman, is opened promptly when the car comes to a standstill and is closed just before the power is applied for starting. On many open cars are bars which are let down at the same time that the side step is thrown back on either side of the car, so that the car can not be freely entered or left on the side next to the other track. In some closed cars it

is the custom to place bars or rails or netting at the open windows to prevent accidents to passengers who might protrude elbows or heads from the apertures at dangerous places, or attempt to use the windows as a means of entrance or exit.

VII.

CAR FENDERS.

A conspicuous feature of cable and electric railway work has been the car fender, the use of which has been required by ordinance in a great many cities, but the adoption of which is by no means universally favored among street railway managers. The purpose of the fender placed at the front of the car, or immediately in front of the wheels, is to push aside or catch up and hold in safety persons who might otherwise be run over. A variety of such car fenders have been introduced, some of them exhibiting great ingenuity. Sometimes the fender is held up on the front of the car and can be released by the motorman in case of an emergency, but this is regarded as open to the objection that when the occasion for its use arises the motorman may not have sufficient presence of mind to do what is required of him, and the car may run over the person before the fender can be lowered. A common type is that which is carried in front of the car a few inches above the track, and which, if desired, can be folded up or carried around to the other end of the car for the return trip. Such fenders have more or less the form of a net, being constructed usually of light slats of metal, with a stout outside rim.

It is objected that many of these life guards are just as apt to cause accidents as to prevent them, projecting, as they do, several feet in front of the car. This objection is sometimes met by arranging the fender so that it collapses when not in use, and is drawn back under the car, whence it is released in case of danger. Few or none of these more elaborate devices are in practical use. The results of experience would seem to show that in most cases where the speed of the car is slightly reduced the fender will pick up without harm or injury persons who, without the fender, would have gone under the car. Even when the car is still under rapid headway, the injury from the fender is not apt to be as great as the injury from a car without such equipment. On Broadway, in New York city, the cars are equipped with fenders carried under the platform, which are technically known as wheel guards. The objection to the projecting fender in such thoroughfares is that because of the density of traffic their general use would add seriously to the obstruction of the streets. Pedestrians and carriages now crossing freely between cars without fenders would, if the fenders were in use, often find passage difficult or impossible.

There are four or five types of fenders in general use in the United States. One of these as used on cars

whose sills are of medium height above the track, is of curved form, and when not in use is held up against the rear dashboard. The upper crossbar of the fender can be adjusted on low cars to a position 15 to 17 inches above the track, and when dropped its front rests directly on the surface of the street, so that no object can pass under it. Sometimes it has at each side a rubber covered spring to prevent a body from being thrown to one side. In cross country and interurban cars this type of fender is made large enough and strong enough to pick up a horse and carry it until the car comes to a stop. In all these fenders there is a cushion against the dashboard, made of strips of strong spring metal, which prevents the object struck from coming into contact with any hard surface on the front of the car. These fenders are dropped by a pedal on the platform, operated by the motorman's foot.

Another type of fender in use in some large cities is composed also of metal slats. The platform of the fender stands at an angle of 45 degrees, with a rubber hose 4 inches in diameter stretching across the lower end, which is usually about 3 inches from the ground. When a person is struck by the fender, the platform, which swings on a pivot, falls back and brings the outer end with its rubber tube about 20 inches above the ground, while the rear end, nearer the car, is 6 to 8 inches lower. Thus a basket or pocket is formed which carries the person safely until the car can be stopped. The back guard is made of a steel spring placed several inches lower. If the car is going at great speed the body will strike against the guard, but can not be thrown out again onto the track. This fender is always in position and requires no action on the part of the motorman.

One type of nonrigid car fender in use to some extent, based upon the principle of receding action, has several plates or detached portions like shutters across its farther end to conform to uneven surfaces, and offset the effects of the oscillation of the car. The receptacle back of these plates is composed of metal network. When in use, the projection of the fender beyond the car is slight; when not in use, it can be pushed underneath the car. Another form of automatic car fender has two automatic release devices in addition to the ordinary foot drop in common use. One of these automatic devices consists of a front trip bar, which is forced back on coming into contact with obstructions. The transmission through lever and cranks of the motion caused by the impact operates the foot pawl of the fender. When this trip bar might prove inconvenient, as in the case of the track being covered with snow, it can be turned aside against the fender and the other automatic device employed in its place. This second automatic device is operated by the impact of the body falling against the fender cradle or netting. The contact with the fender pulls forward rocker arms attached to levers which operate the foot

pawl. The complete fender is attached to a car by iron bolts connected with the outside sills of the car platform. It folds up compactly without interference with the car couplings or headlight, and can be used on various styles of cars. The front of the fender is made of rubber tubing, with a steel cable passing through it.

According to Table 95, of the 66,784 cars reported, 60,290 were passenger cars, of which 43,273, or about two-thirds, were equipped with fenders. The state of New York, with a total of 14,040 cars, reported 7,123 equipped with fenders. The small proportion equipped with this device is due to the fact that cars of the elevated systems are operated in trains and need no fenders. In Massachusetts 7,021 cars out of 8,310 were reported with fender equipment. In Illinois 3,214 cars out of 7,778, and in Pennsylvania 5,693 out of 7,058 are equipped with such a device.

VIII.

CAR LIGHTING.

Of the total number of cars reported 62,369, or 93.4 per cent, were lighted in some manner. Out of this number 55,703 were lighted by electricity and 6,666, including all horse cars, were lighted by oil or gas. The detailed figures for states and companies are shown in Table 95. A number of states report all or nearly all of their cars lighted by electricity. Among these states are Connecticut, Iowa, Massachusetts, Minnesota, New Jersey, Ohio, Pennsylvania, Rhode Island, Virginia, and Wisconsin. Cars lighted by electricity are found exclusively on roads using electricity as a motive power, the supply of current thus being rendered easy and cheap. The change in the manner of lighting cars therefore closely followed the change in motive power.

The unsatisfactory oil lamp was in the beginning the only method of car lighting. This lamp was superseded on some of the cable lines by compressed gas, the illuminant commonly employed on steam railways. With the introduction of electric traction it was found to be an easy matter to light the cars by taking the current from the same circuit as that which supplied the motors. The light is still somewhat flickering from the occasional variations of voltage, interruptions of the trolley contact, or jolting at the switches, when for an instant or two the current is lost. This has sometimes been prevented by the installation of storage batteries on the cars which could be fed from the line, but this practice has been given up as the advantages did not compensate for the expense and trouble.

The lights usually installed are 16 candlepower in multiples of 5. The use of the lamps in groups or multiples of 5 is due to the fact that the average voltage or current pressure of the line is about 550 volts, and as the ordinary incandescent lamp takes about 110 volts a group of 5 of them will absorb the trolley line voltage



TYPES OF STREET RAILWAY CAR FENDERS.

without the necessity of employing extra resistance. The 5 lights are arranged in series across the motor circuit and are provided with a fuse and cut-off switch. At first ordinary incandescent lamps were used, but as jolting broke the filaments it is now the practice to "anchor" the filament by a small hook sealed into the lower larger end of the glass bulb. In some instances the lights are not merely distributed within the car, but out on the platforms, and the headlights are also usually electric. The electric headlight usually consists of a large incandescent lamp aided by a powerful reflector. A variation of this light consists in the utilization of what is known as the "inclosed" arc light, including an inner globe immediately around the arc. This is associated either with a rheostat or with a small cluster of incandescent lamps, so that either or both can be employed in accordance with the amount of light required. The car has to be specially wired for such purposes. In the early stages of development the circuits were simply run with ordinary insulated wire held down with staples, cleats, or molding. Even the main circuits from the trolley line to the motors were carried through without much protection, but it is now a general practice to inclose all these circuits in conduit, usually of iron pipe.

IX.

CAR HEATING.

It appears from Table 95 that in 1902, 30,159 cars, or about one-half of the total number of cars in the United States, had provisions for heating. Of this number 19,021 or 63.1 per cent were heated by electrical apparatus, while 11,138 or 36.9 per cent were heated by stoves, hot water, or other means. Electrical heating is necessarily limited to street railway systems and cars electrically equipped, the heat being derived from the circuits supplying current to the motors. It will be noticed, however, that some companies using electricity as the motive power still employ stoves for heating.

In northern climates in the old-fashioned horse cars, the coal stove was long used in winter. The car was so arranged that a stove could be introduced in the middle of one of the seats, with a pipe running up through the roof. The stove occupied space which would otherwise have been available for seating; it did not successfully heat the car, and fires frequently broke out.

Gas and oil stoves on a somewhat similar plan were also tried, and indirect methods of steam and hot water heating have been extensively experimented with, especially on interurban lines. The objections to this latter plan, however, have been the loss of time involved in refilling the steam and water reservoirs and the large incidental waste. Hot water heaters have been largely used on long interurban cars.

The usual method of heating cars electrically is to place the heaters—composed of coils of resistance wire in various forms and grouping—beneath the seats at

regular intervals, the fronts of the radiators being protected by grating and the switches being so arranged that the car conductor can throw in some or all of the heaters, as required.

The circulation of air through the resistance coils in which the passage of current is engendering heat is so rapid that while the flow of warm air from the top of the heater is large in volume the air itself is not hot enough to heat unduly the front casing of the seat. In a test of an electric heater an overload of 25 per cent of current was put through it, the casing being entirely covered with damp clothes, such as passengers might wear. The current was left on for a half hour, and at the end of this time there was not the slightest indication of burning or discoloration of fabrics. It has been shown by tests that with an ordinary consumption of current of 3,160 watts a car with 4 doors and 16 windows, containing a little more than 1,000 cubic feet, traveling in an outside temperature of 28 degrees Fahrenheit, can maintain a temperature of 54 degrees Fahrenheit. Assuming that this degree of heat and consumption of current were maintained throughout the day of eighteen hours, and that the current cost the company about 1 cent per kilowatt hour, a cost for heating such a car would be slightly over 50 cents per day. The actual cost, however, would probably average well below this figure.

X.

REGISTRATION OF FARES.

The collection and registration of car fares has always been an important problem with the street railway companies, the one great aim, of course, being to secure payment from all passengers and to prevent the diversion of revenue from the tills of the company to the pockets of dishonest conductors. The task becomes a relatively easy one where a ticket system is employed, requiring the passenger to buy one ticket for a continuous ride, and to deposit that ticket with the conductor or in some appropriate receptacle. This is the plan that has been followed for many years on the Manhattan Elevated system in New York city. Each passenger is required to deposit a ticket in the box at the entrance to the platform, under the charge of the regular custodian. This method has been varied in some of the elevated stations by the introduction of a registering turnstile; but where the volume of traffic is great, as it is at so many elevated stations during rush hours, turnstiles would not be tolerated, and even at the smaller stations they do not appear to have proved entirely successful.

In Europe it is the common practice to issue tickets, not only for elevated and subway railways, but also for the regular street car and omnibus lines. In America it is thought that the travel on street cars is too much of a "come and go" character to permit the use of a

ticket system, and hence the collection and registration of fares usually depends wholly upon the conductor.

In the early days of the bobtail car the driver was also conductor and made change as well as managed his horses, the fares being deposited under his eye in a small lock box adjacent to the front platform—the box being so placed as to be seen by the passengers. This method still obtains in a few places, but its many inconveniences caused it to give place to the old portable bell punch, which enabled companies to settle with their conductors upon the basis of the showing made by the punch rather than upon the basis of the conductors' report of the number of fares collected. It soon became evident, however, that in a crowded car a conductor is likely to miss some fares, either from the unwillingness of the passengers to pay, or from the inability or unwillingness of the conductor to make collections. Although the conductor carried a punch, it did not follow that he would use it every time a 5-cent fare was collected, nor was it absolutely certain that he would ring up the fares on the company's bell punch instead of on a substitute one provided by himself. To remedy these difficulties, companies soon began to use the stationary clock register or counting machine, which is placed in a conspicuous part of the car where every passenger can see it, and upon which fares collected are supposed to be duly "rung up." The fare register system has now become universal throughout the country. Many modifications and improvements have been made to adapt the register more perfectly to varying conditions of service and to the varying practice in different places in the matter of collecting fares and issuing transfers. To obviate the disadvantages of the single register system, which, of course, would count only one class of collection, namely, so many 5-cent cash fares, the double register came into vogue, allowing other combinations of accounting, and consisting virtually of two single registers in one case.

When it is considered that the street railways are carrying at least 6,000,000,000 passengers a year, all of whose fares have to be brought to book by means of the register, it will be seen that the accounting and mechanical problems involved are of no mean nature. To show to what extent ingenuity in this direction has been carried in the way of making a street car register perform various functions, such as the registering, indicating, and printing a statement of collections—in other words, performing the full duty of a cash register and something more—the developments up to date deserve note.

Registers now on the market and largely employed by street railway companies make a distinct registration of each fare collected, the different kinds of fares being registered separately. They also keep a printed record of the collections of each conductor and of the total number of all fares, irrespective of class, as well as the number of fares in each class for each half trip. They

further print the number of registrations, the trip number, the date of the day and month, the direction in which the car is going, the name of the conductor, and a duplicate or triplicate summary record of the day's business, irrespective of the number of conductors who operate it. When not in service the register may be locked, and can not be operated until the conductor's badge number is printed upon the statement inclosed in the register. This device, then, without exceeding a practicable limit of size, acts as an adding machine, a cash register, a time clock, and a printing press, all applied to the task of insuring for the company the fullest collection of its revenues. Few companies, to be sure, use or greatly need registers that have been brought to any such degree of complexity of mechanism, but the instrument none the less illustrates in an interesting way the attention and inventiveness that have been applied to every branch of the street railway business.

XI.

STREET RAILWAY PASSENGER STATIONS.

The statistics for street railway passenger stations refer to the separate buildings, or public shelters, at which passengers wait to take cars, pay fares, or secure transfers. They do not include stopping points, or open-air stations along the line where passengers board the cars. There are 2,076 street railway stations reported. A large number of these were reported by elevated railways, by railways formerly operated by steam, and by fast long interurban railways. Until within the last few years it has been the universal practice to permit passengers to board or leave a car at any street corner, in contrast with the steam railway practice of running trains between fixed points more or less widely apart. A number of street railways have long furnished waiting rooms at their termini, however, or at important intersecting points, and elevated and underground roads have been operated on the station plan. In order to secure a speedier schedule, several street railways have adopted the practice of putting up signs on poles at points several blocks apart where the cars would stop, the points being located with reference to traffic demands. These points have very rarely had shelters connected with them. Within the last year, however, the growth of interurban roads has necessitated the construction and maintenance of a large number of passenger stations, and these stations have either been connected with freight and baggage rooms or with substations that contain apparatus for furnishing current to the track.

The further differentiation of interurban roads from ordinary street railway lines within cities led to the establishment of interurban waiting rooms, both inside and outside of city limits. The final step has been the construction of union terminal stations for street railway traffic. While this report has been in preparation,



A TYPICAL TROLLEY PARK IN MASSACHUSETTS.

an extensive and costly terminal station has been erected at Indianapolis, Ind., for the use of nine interurban lines. At Milwaukee, Wis., the street railway company has erected a substantial steel frame structure to be used as an interurban terminal station and general waiting room, office building, and storehouse for reserve cars. At Detroit, Mich., there is a common waiting room for all interurban lines, and at Muncie, Ind., an important interurban center, a terminal building has been built for the same purpose. At Cleveland, Ohio, one of the most important interurban centers of the country, a large station has been erected on the public square in the heart of the city, where waiting sheds have been in use for some time. The building is 62 feet long and 13 feet wide, the roof extending beyond the walls 12 feet at the ends and 4 feet on the sides. It is of brick, with stone copings, the framework of structural steel, and the roof of tile. The ticket office and check rooms are so located as to divide the interior into two rooms, the smaller being a smoking room and the larger a passenger room. Doors at the ends open to stone steps leading to the basement, where are toilet rooms for men and women. Its cost was about \$10,000, each of the five interurban companies that use the building paying one-seventh of the cost and the city company two-sevenths. While all stations are not as well located as the station in Cleveland, many of them are convenient of access. The station at Indianapolis is located one block from the street railway center, and that in Milwaukee but one block from the principal street in the city. The agreement with the authorities provided that the Cleveland station should be erected in accordance with plans approved by the city, without any expense whatsoever to the municipality for construction and maintenance and to become the property of the city as soon as completed. The railways are given the right to use this station without any assurance as to length of occupancy. The interurban roads which are to use the station have no trackage in Cleveland, but run their cars into the city over the tracks of the Cleveland Electric Railway Company. The agreement provides that nothing but tickets may be sold in the station.

Admirable types of passenger and substations may be found on many of the interurban roads. In the vicinity of Cincinnati, Ohio, for example, two very attractive substations are located on the Suburban Railway. The one at Forestville, Ohio, is of stone and buff pressed brick with stone trimmings and ornamental tile roof, two stories high in the center with a one-story wing at each end. The upper floor of the central part is arranged with a suite of five rooms for the attendant of the substation, while the lower floor is occupied by the alternating current transformers and rotary converters. Each of the wings is 25 feet in length, one being a passenger waiting room, and the other an express office. On many of the interurban roads the stations resemble in general appearance and design the way stations on

steam railway lines. A number of the stations referred to in the report are those connected with the parks and pleasure grounds operated in connection with street railways, or reached by them. A good example is found at Fairmount Park, Philadelphia, where the facilities of this kind are of an extensive character. The illustration presented herewith shows a pleasure ground station at the terminus of the Worcester and Southbridge (Mass.) Railway Company.

XII.

CAR HOUSES.

Statistical presentation.—The street railways of the country were required to report the number of car houses used by them, and the statistical results of the inquiry are given in Table 95. It appears from the table that 1,634 car houses were reported for the United States. These are widely distributed, but the states reporting the largest number are as follows: Massachusetts, 236; New York, 177; Pennsylvania, 173; Ohio, 138; Illinois, 96; New Jersey, 64; Michigan and Missouri, each 56; Connecticut, 55; California, 51; and Indiana, 50.

It will be noted that Massachusetts is far in the lead as to the number of car houses. Of the total number reported for that state, 115 are reported for the Old Colony Street Railway, the Boston and Northern Street Railway, and the Boston Elevated Railway. As these three companies report a total of 5,937 cars of all kinds, the car houses would seem to have an average capacity of 52 cars per car barn.

In New York state there were 14,040 cars accommodated in 177 barns, giving an average of 79 per car barn. This average, however, is brought up by the influence of such unusual figures as those of the Interurban (or Metropolitan) Street Railway Company of New York city, which accommodates 3,063 cars in 15 barns, an average of slightly over 204 cars per barn. This statement of itself gives an idea of the large amount of valuable property required in the heart of a great city merely for car storage, inspection, and repairs.

The state of Pennsylvania, with an aggregate of 7,058 cars and 173 barns, had an average of 41 cars per barn. Ohio, with 138 car barns and 4,395 cars of all kinds, had an average of about 32 cars per barn. Illinois, with an aggregate of 7,778 cars and 96 barns, had an average of 81 cars per barn; but these figures again are brought up by the totals for the two leading systems in Chicago, the Chicago City Railway and the Chicago Union Traction Company, which, with 22 barns, accommodated 4,818 cars, or 219 cars per barn.

Taking the country as a whole, it appears that with a total of 817 operating and 170 lessor companies, or a total of 987 companies, the average is not quite two car barns per company. These figures are worthy of

detailed study from various standpoints, although they do not clearly show the burdens imposed upon the companies in making provision for sheltering their cars. Where a company has a large number of cars intended for winter use only, and a proportionately large number of open cars available only for summer use, it stands to reason that the car barn provision must be very much larger for the same aggregate of traffic than where a combination type of car is made to do duty the year around. Combination cars used throughout the year may be used up more quickly, though even this is not proved; but obviously less thought and money need be spent on the question of storing the cars when not in service.

Construction and equipment.—Great improvement has been made in recent years in the construction of car houses, which, until the advent of the trolley, were known as "car barns." In spite of the great attention given to fireproof construction of these buildings, the frequency of fires in such places has led insurance companies to increase the rates quite generally on such properties, and to be extremely careful in their inspection and rating. This in turn has led to further improvements, so that to-day many of the latest car houses compare favorably in fireproof quality with any other structures. If not properly built and properly looked after, a car house may become a dangerous risk, on account of the inflammable material usually gathered within its walls in the shape of cars, largely composed of wood, and large quantities of repair materials, paint, oil, varnish, etc. A very little indifference on the part of tired or careless men around the repair pits or stoves in a car house may result in a serious conflagration. Modern practice, therefore, in general requires that car houses shall be subdivided more or less so as to isolate and segregate a fire that may break out. Those of the most approved construction are one story in height, built of brick or stone, or both, with walls not less than 12 inches thick. Where there are two stories the lower one has walls 16 inches thick. The ground area of a separate section should not exceed 10,000 square feet. The fire walls throughout are built of brick, are without openings, and extend 3 feet above the roof. A heavy mill roof of 3-inch plank, covered with gravel, slate, or tin, is probably better than an iron truss roof with composite ironwork. Floors throughout are of brick, concrete, cinders, or dirt where the building is of one story, and a heavy mill construction is used for everything above the first floor where the building is of more than one story. The repair pits are of brick, with brick or concrete floors, each one extending under one track only, with steps of iron or other noncombustible material. These pits are located as near the rear end of the car house as possible, and are confined to one section of the house. The tracks in such a building run "clear" without a break, and the transfer tables are so arranged as not to

interfere with the smooth and quick running of cars within the building. Inside protection is furnished by liberal standpipe water service, under heavy pressure, and provision is made for cutting off all power wiring from a point outside the house, leaving the trolley lines "dead" several feet from the front. There is also a liberal provision of fire pails and chemical extinguishers, as well as of fire hose. Oils, paints, and lamps are stored in a separate building, which is fireproof and ventilated. Few car houses answer to all these requirements, but there is a steady tendency to eliminate in every case the bad features and to adopt those which have been outlined above as standard, in compliance with the general requirements of the underwriters, as every deviation involves a higher insurance rate.

The variations in the details of car house construction are almost as numerous as the car houses themselves, and it would indeed be difficult to mention any two that are exactly alike. Some of the most interesting recent work is that connected with interurban roads, where the car house is also associated with other details of the system, and where special attention has, therefore, to be given to the insurance and to other features that are not considered in the building of a mere car shed.

Thus in Newark, Ohio, there is a large car house operated in connection with the interurban system, which includes Columbus, Newark, and Zanesville roads, and the Newark and Granville and other properties. This car house not only provides repair shops for the system, but it also receives current from the distant generating plant and serves as a substation for the rotary converters and alternating current transformers. The building is of brick, with sandstone trimmings, and is divided by a brick fire wall into two main parts, with an annex at one side containing offices, boiler room, lounging room for the men, and the substation. Each half of the main building is 60 feet from wall to wall, and contains working pits, machine room, repair shops, etc. There are 10 tracks with a capacity more than sufficient to accommodate all the cars on the system. The roof is built of steel trusses, covered with corrugated iron on purlines.

The Schenectady Railway Company has a very complete system of car houses and repair shops. It may be noted, by way of explanation, that the great amount of mechanical equipment required by many of the roads for the purpose of repairs has often led to the building of extensive and elaborate machine shops. Thus, for example, one of the buildings belonging to the Schenectady system, which was formerly used for the two purposes of a car house and repair shop, has been converted into a car house, while a new building has been put up for repair shop purposes exclusively. This new building is in three sections, with outside measurements of 201 by 210 feet. The first section contains an armature room, machine shop, and black-

smith shop, and adjoining the blacksmith shop an erecting room, with 300 feet of car pits. The middle section of the building has two floors, the front of the second floor being used for offices and the remainder for store-rooms. The first floor of this section has a steam road switch running through it, and a teaming entrance in front provided with platform scales. In the rear is a large store yard for special work, rails, ties, and other heavy materials. The third section, which has three tracks, is divided in the middle from side to side, the front part being a machine shop and the rear a carpenter shop. Some idea of the equipment that goes into a modern street railway machine shop may be derived from the fact that in addition to the equipment already possessed, the company in equipping this building purchased two 15-ton hand operated cranes, a motor flat car equipped with an electrically driven crane of 5 tons capacity, a power rail bender, and a number of shapers, planers, boring mills, etc. The Schenectady company has also a well-equipped emergency house, with tower wagons which are provided with hose crossings, tools, and wire. This house is arranged after the manner of a fire engine house, and is connected with the fire department alarm system of Schenectady. The wagons respond to calls in all districts covered by its lighting and railway system.

Another interesting and up-to-date car house equipment is that of the Aurora, Elgin and Chicago Railway, an interurban system completed since the close of the census of 1902. The car house and repair shops of this road conform very closely to the standard, which has been explained in detail. The car house built in 1902 is in three sections, with two single tracks in each outside section for car storage, and in the middle section three tracks, two of which have repair pits beneath them. The floor between the tracks is much lower than usual, giving the men a space of from 20 to 24 inches in which to get at the sides of the trucks without lying down, as is necessary where the floor is built level with the rails. The repair pits are 4 feet 8 inches deep, giving plenty of room for work underneath the car. Across the central portion of the car house and spanning these three tracks is a 10-ton electric crane, which travels the entire length of the repair shop. This would be an abnormally heavy crane for a car house and shop of this capacity but for the fact that the interurban rolling stock of the system is very heavy, the cars being each equipped with four 125-horsepower motors. The width spanned by the crane is 40 feet. Each of the repair tracks accommodates one car. Though this building is spoken of as a car house, and answers that definition in almost every respect, it may be noted that the company follows in general the practice of steam railways of storing cars in the yards instead of in the house. There are yards in the front and rear of this car house and repair shop, and both

yards join a main line of the track, the yard being thus a loop-off of the main line.

Lighting of buildings, shops, car houses, ways, etc.—In connection with the information furnished as to car houses, the street railway companies were asked to give statistics as to the lighting of their buildings, it being conjectured that in the aggregate a large amount of electric lighting would be shown. The companies naturally avail themselves of their own current, because they generate it in such quantities that the fraction added for lighting purposes would increase but imperceptibly the general cost of current production. Some car houses are illuminated by special low-voltage lighting dynamos, but most of them employ 500-volt current from the trolley wires. In these cases it is good practice to have the wires supported not less than 1 inch away from the walls of the building, ceiling, or floor, and to protect them carefully against accident or mechanical injury. In examining the mechanism on the underside of the cars, portable lights are often found necessary, especially in the car pits, but in every case where practicable preference is given to fixed lights. This is true also where gas is employed, all fixtures being rigid and the flames being kept at a considerable distance from any adjacent woodwork. According to the returns of the companies reporting electric lights employed in their buildings, shops, car houses, etc., 5,282 arc lamps and 235,955 incandescent lamps were in use for this purpose. The amount of lighting was usually about proportionate to the magnitude of the system reporting and to the number of the miles of track and cars owned. As will be seen from Table 95, New York reported 901 arc and 40,346 incandescent lamps; Massachusetts, 594 arc and 34,212 incandescent; Illinois, 369 arc and 22,388 incandescent; Ohio, 470 arc and 17,207 incandescent; Pennsylvania, 631 arc and 13,110 incandescent; New Jersey, 191 arc and 11,782 incandescent; Michigan, 107 arc and 10,406 incandescent; Indiana, 95 arc and 5,843 incandescent; and Missouri, 39 arc and 11,325 incandescent.

Some of the systems reporting have for their own use a larger amount of lighting than is furnished by many a good sized central station lighting plant for general urban purposes. The Boston Elevated Railway, for instance, reported 353 arc and 19,096 incandescent lamps; the Manhattan (Elevated) Railway, 200 arc and 8,000 incandescent; the Brooklyn Rapid Transit system, 150 arc and 9,000 incandescent; the Interurban (Metropolitan) Street Railway system, of New York city, 150 arc and 5,000 incandescent; and the Cleveland (Ohio) Electric Railway Company, 100 arc and 2,960 incandescent. In St. Louis, Mo., very few arc lamps were employed in car houses, shops, etc., but nearly 10,000 incandescent lamps were in use. In the same manner the Detroit United Railway Company did not report any arc lamps, but it had 1,800 incandescent lamps. On the other hand, the Pittsburgh Railways

Company reported 220 arc and only 1,000 incandescent lamps. As a general rule, the roads in Philadelphia reported few of either kind of lamp. In Chicago, also, relatively little electric lighting was reported in spite of the extent of the electric systems there, the largest amount being reported by the Chicago Union Traction Company, with 100 arc and 1,500 incandescent lamps, and the Chicago City Railway, with 70 arc and 2,700 incandescent lamps. The Metropolitan West Side Elevated Railway of Chicago employed no arc lamps, but had 6,000 incandescent lamps in service. It is perhaps a fair inference that a large part of the lighting was for station purposes. The Rhode Island Suburban Railway Company, of Rhode Island, and the Union Railroad of Providence together reported 110 arc and 4,660 incandescent lamps.

XIII.

TELEPHONE SERVICE.

Two hundred and fifty-seven street railway companies reported exclusive telephone service, employed chiefly for car dispatching purposes. They used 5,868 miles of line. This does not include rented circuits or instruments or other apparatus leased from telephone companies. Detailed statistics with regard to the mileage of telephone lines will be found in Table 95. A considerable proportion of the mileage is found in the service of companies doing an interurban and rural district railway traffic. For example, the extensive system of the Union Traction Company of Indiana has 222 miles of telephone lines. In Massachusetts the Boston and Northern Street Railway Company reported 182 miles; the North Jersey Street Railway Company in New Jersey, which covers a large section of the state, reported 150 miles of telephone line; the Detroit United Railways Company of Michigan operated 150 miles; and in New York state the Hudson Valley Railway Company reported 137 miles.

As already noted the telephone is principally employed for car dispatching, especially on the interurban and suburban lines. On some of the longer and faster roads the automatic block signal system is in use; but the telephone has been found to lend itself to interurban railway work, on even the more important network of lines. The overhead line construction is particularly well adapted to the system, especially where center poles are used, as the telephone wires are thus brought near to the cars. But even with side poles there is little difficulty in making the connection, the only additional requirement being a longer cord between the telephone pole and the telephone. The telephone can be employed either by locating the telephone box or instruments within the car itself, or by attaching the box, under lock and key, to one of the poles along the route. An alternative method requires the car conductor to carry with him a portable tele-

phone set, which he can plug in at any given point along the line where connections have been provided.

One method of using the system is to run two parallel telephone wires along the road with which the telephone is connected by means of double hooks, one above the other, or by a double-pronged hook introduced between the two telephone wires. The object of the two wires is to provide a metallic or two-wire circuit, which insures better service by cutting out the induction which would result from a one-line wire with ground return. This plan has been followed on the St. Louis, St. Charles and Western Railway, where two telephone wires are carried, one above the other, on insulators attached directly to the line pole, thus rendering the use of cross arms unnecessary. This telephone circuit runs the entire length of the road, with permanent connections to the line wires at the fixed telephone instruments in the offices or stations of the road. There are no telephone stations or connection boxes along the track of the route, but the telephone set is installed within the car. The telephone is used only when the car is stationary, and the connection with the line wires is effected by an ordinary fishing pole with telephone cord running along it. Two hooks are fastened to the extremity of this pole, the distance between them being a little less than that between the telephone line wires at their point of support. The upper hook has a spiral spring which allows considerable adjustment between it and the lower hook to insure good contact for both of them. The upper hook being caught into position, the weight of the pole causes the lower hook to rest securely in touch with the other wire.

The telephone system is largely used in connection with single track roads, especially at turn-outs. The practice in train dispatching on the interurban lines around Detroit illustrates the method. All the electric interurban railways radiating from Detroit operate under dispatchers' orders given by telephone. The methods used by the three different managements which operate these lines are very similar, and differ only in detail. In each case telephones are located in cabins or booths at sidings along the line, and no telephone instruments are carried on the cars. The orders are all received orally, and no written record is kept. The Detroit United Railway system operates all its interurban lines, except the Wyandotte division, from one dispatcher's office located at Royal Oak junction, 14 miles from Detroit, from which point the dispatcher has telephonic communication with the whole united interurban system. Orders are received at the telephone booths by the conductors and are repeated to the dispatcher. The motorman must be within hearing to hear the order repeated.

The telephone lines are mainly of iron wire. Those outside the city are run on brackets with "pony" insulators. To prevent inductive disturbances they are transposed every 10 poles, and in the case of high-

tension alternating current lines, are transposed every 5 poles. The standard telephone equipment for the booths consists of a telephone instrument with an 1,800-ohm ringer, and a 5-bar magneto-generator which will ring through 60,000 ohms resistance. The instruments in each booth are connected with the line through a double-pole, single-throw switch. This switch is open when the telephone is not in use, in order that the line may not be rendered inefficient by having a large number of instruments bridged across it, thus increasing unnecessarily the resistance of the circuit. At the dispatcher's office there are switchboards in duplicate for the dispatcher, so that in case anything goes wrong with one board the other can be immediately switched in. There are four lines entering the dispatcher's office; connection with any one of these is established by simply throwing an operator's switch. The circuits are so arranged that communication can be had with many points on the system from two directions, and double-pole switches are placed at frequent intervals. In case a line is short circuited or grounded at a certain point, the switches on both sides of the trouble can be opened, and the work of dispatching can then be carried on without interruption. Within the city of Detroit telephone lines are frequently suspended from the electric railway span wires by means of porcelain insulators. This keeps the telephone wire in the middle of the street where it is free from interference by the trees.

One of the most interesting telephone systems recently put into operation in street railway service is that of the Manhattan Railway division of the Interborough Rapid Transit Company, of New York city. The exchange is located at Ninety-ninth street and Third avenue, in operating rooms built for the purpose above the car shops of the company. The main operating room contains the switchboard, the distributing frame, fuse rack, relay and coil racks, and the wire chief's desk. The board is

of the "central energy" type with all the battery concentrated at the main office. The greatest distance from the central office to the instruments is about 8.5 miles. There are positions for 6 operators at the switchboard, each position being equipped with 15 pairs of intercommunicating plug circuits, consisting of double supervisory signals and combination ringing and listening cams. There is a testing section on the board, including a voltmeter and cord circuits for making ordinary line tests.

At the present time about 300 lines are in use, but the board as equipped would allow the operation of about 600 lines. The board is operated in the usual way with signal lamps, with additional bell signals for night service. The wire chief's desk is placed well in front of the switchboard and is so arranged that the attendant in charge can act both as monitor and as wire chief. Telephones are located in each passenger station and switch tower along the elevated tracks of the Manhattan Railway, as well as in all the offices, the power house, substations, and car shops.

Two styles of telephones are in use in the system. One of these is a wall type, which is employed in all the car shops, switch towers, inspection sheds, etc. The other style is a desk telephone, which is at the elbow of the ticket seller in his booth, and puts every station in direct touch with headquarters. All the outside wiring, connecting the exchange with the instruments, consists of lead covered cable, containing from 5 to 120 pairs of line. These cables are carried by a galvanized wire fastened to the elevated railroad structure with iron brackets or hangers. The force required for the system consists of the telephone engineer, 8 operators, and 5 repairmen. The operators work in 3 shifts, with 5 operators at the board in the busiest time of the day.

CHAPTER IV.

INTERURBAN RAILWAY CONSTRUCTION AND EQUIPMENT.

In the Eastern states, until recently, the interurban roads have been usually an extension of some city system, owned and operated by it, and presenting few, if any, differences in the rolling stock and equipment within the city and outside. On the other hand, from the beginning of interurban railway construction in such states as Ohio, Indiana, and Michigan, as well as in those states farther west, cross country roads have often been planned and constructed to parallel and compete with steam railways, or to supply transportation to sections which the steam railways had not found it profitable to reach. It thus appears that, while many of the eastern interurban systems, which have now grown into networks of considerable magnitude, present close analogies to the street railway systems, of which they still remain a part; not a few of the western roads are to all intents and purposes steam railways, with the substitution of the self-contained electric car for the steam locomotive.

Where the interurban road is an outgrowth of the street railway system the tracks and roadbed are usually of the character to be found in semicity districts. In some instances, as, for example, in the case of the road between Albany and Schenectady, N. Y., a distance of about 18 miles, the construction of the road has helped the building in rural regions of roadways of a superior construction, such as would probably not have been found there but for the trolley.

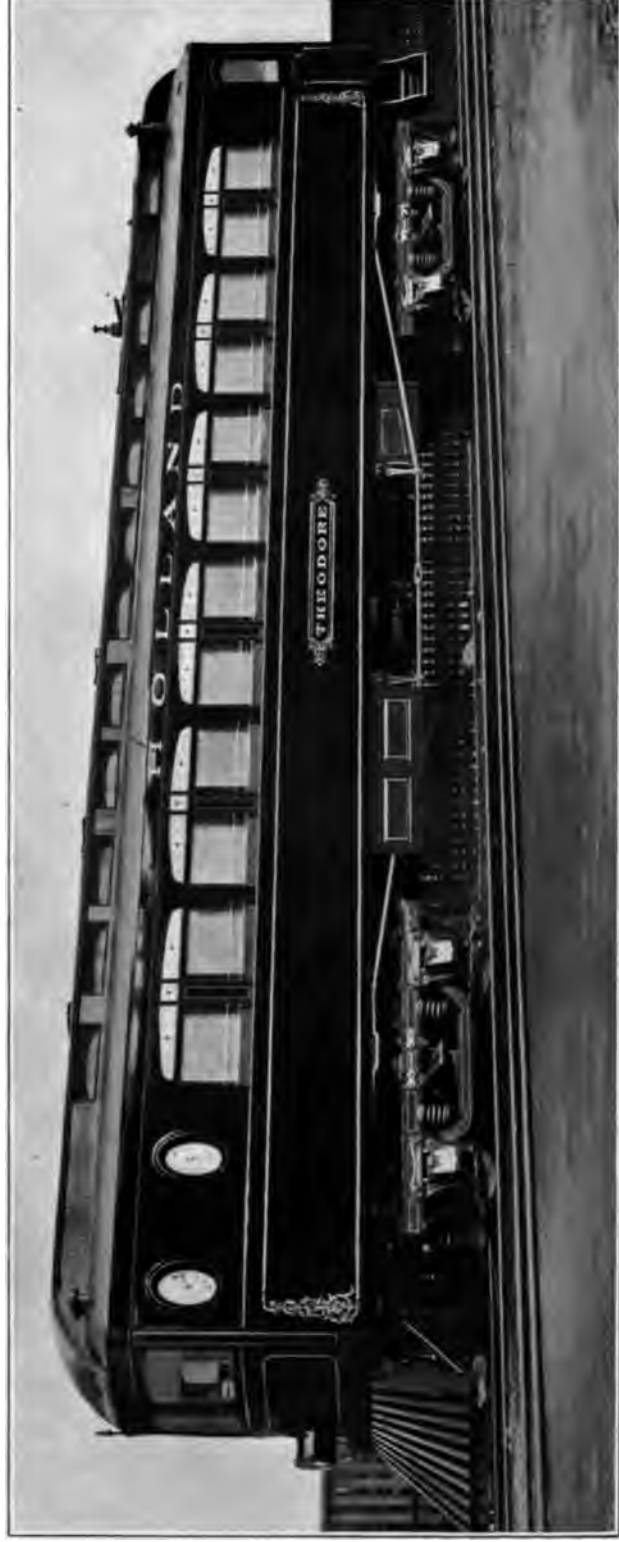
In the Central West at least 75 per cent of the interurban roads are located on private rights of way, which usually follow the line of the public highway. The private right of way is from 30 to 40 feet wide for single track roads, on which a standard roadbed is laid with 70 to 80 pound rails and with No. 0000 copper bonds at each joint in the rail. As a general thing the electric roads have been less careful than the steam roads to avoid grades and curves. The engineers have often relied upon the high-tractive ability of the electric motor car, as compared with the locomotive, for work on steep grades. The bridge construction along such roads, however, is very often of a superior character, consisting of steel girder construction and comparing favorably with steam railway practices.

In the case of single track interurban roads, bracket construction is generally used for the overhead wires, with poles about 35 feet high, set from 90 to 100 feet apart. The bracket arm has flexible suspension for the

entire length of the trolley wire. Two trolley wires are usually employed as a means of avoiding overhead frogs at turn-outs, which makes possible the maintenance of high speed and avoids interruption of the service in case of the breaking of one of the wires. The trolley poles also carry the high-tension lines transmitting the alternating current, which is lowered in pressure and converted into direct current at the frequent substations, for use on the service wires and cars. Copper wire is largely in use for this current and for the direct current feeders, but already about 20 per cent of such circuits are composed of aluminum wire, which is being experimented with. The three high-tension wires constituting the three sides of the three-phase circuits running from the generator at the power plant to the transformer at the substation are usually carried at the tops of the poles in the form of an equilateral triangle, with the wires 8 inches apart. In this way pressures as high as 40,000 volts are successfully sustained. The circuits are carried on glass or porcelain insulators, and are protected by lightning arresters against storms which might otherwise do damage to line and cars.

Third-rail traction.—A considerable number of interurban roads have adopted the third-rail system. One of the most noteworthy of these, technically, is that extending from Albany to Hudson, N. Y., which has been in operation for two or three years, and which has an unprotected third rail.

A notable system with protected third rail is that extending from Wilkesbarre to Hazelton, Pa. The contact rail, which is the main feature of the system, so far as this section of the report is concerned, is protected from sleet and snow by means of a hood, made of 2 by 6 inch pine plank held directly over the rail, supported by oak posts spaced every 8 feet. Both guard and rail are carried by unglazed vitrified clay insulators, spaced every 10 feet on the ties. Owing to the protection over the third rail the contact shoes or plows are in the form of a tongue or thick plate extending outward horizontally from the car truck, so pivoted and ratcheted that its adjustment to the rail can be changed readily. There is also a switch governing the connections between the third-rail shoe and the overhead trolley, which is employed for use within city limits. This railway is 26.2 miles in length and the journey by steam road between these two cities has hitherto occupied two hours. At the same average speed the Wilkesbarre and Hazelton



EXTERIOR OF FIRST AMERICAN TROLLEY SLEEPING CAR.

road can carry passengers in seventy minutes or less between the same points. The speed ordinances governing the movement of the cars in the streets of the respective cities leave only forty minutes out of sixty or seventy in which to cover the distance over the private right of way. There is a difference of 1,200 feet in the altitude of the terminal points and the right of way, 60 feet wide, is so laid out that throughout the entire line there is not a grade exceeding 3 per cent and only one curve of 18°. The grade thus established necessitated some heavy fills and deep rock cuts and a tunnel 2,600 feet long through the Penobscot mountain.

Another interesting third-rail system is that of the Jackson and Battle Creek Traction Company, connecting the cities of Jackson and Battle Creek, in Michigan, about 45 miles apart. This road is single track and built on private right of way. It has a third-rail contact, with the contact rail outside the track rails. The head of the contact rail is 6 inches above the track rails, and is supported on reconstructed granite insulators without iron top or base, placed every 10 feet. At road and farm crossings the third rail is broken and the circuit is continued under the track with lead covered and paper insulated cables. At these points the third rail is provided with oak inclines or tips.

A third-rail system has been built on the Pacific coast between San Francisco and San Rafael, a distance of 13.69 miles, by the North Shore Railroad Company, which had previously operated by steam. For the third or contact rail, which is placed outside the regular track, 60-pound rails are used over about half of the line in 30-foot lengths, and 56-pound rails over the rest. The ends of the rail at crossings are tipped or fitted with an approach block in the usual manner. The rail is mounted on block insulators fastened to the ends of every fifth tie, so as to give the insulators 10 feet between centers. Wooden insulators have been used for this purpose, and this cheaper construction appears to have been justified by the successful operation of the road in all kinds of weather, although this region is free from snow and sleet. The material used for the insulator is California redwood covered with a coat of asphaltic paint. The top of the contact rail is 6 inches above the top of the running rail, and the center of the rail is 27 inches outside of the gauge line of track. Where the roadbed will permit, the contact rails are supported on beams 4 by 6 inches laid across two ties, and fastened to the latter by wooden treenails. Where an earth support is used, the contact rails are supported independently of the track by means of strips 2 by 6 inches and 3 inches long treenailed to the tops of stout posts driven into the ground to such a depth as to give the correct elevation to the contact rail. In the yards at Sausalito and San Rafael the contact rail has been equipped with a guard or hood, the device employed being similar to that used on the Wilkesbarre and Hazelton road. At station platforms the contact

rail is still more carefully guarded. At crossings, stations, and other exposed points warning signs have been placed. The total mileage of electrically operated track on this system is 13.69 miles.

Passenger cars.—The rolling stock of interurban roads is very often quite similar to that employed on urban systems, but important modifications have in many cases been made to meet local requirements. A fast schedule is a desirable feature of strictly interurban service, and this is determined by the character of the rolling stock and roadbed. Yet the maximum speed becomes important only when the length of the run between stops exceeds 1 or 2 miles. In the usual mixed city and interurban service stops will vary from ten to the mile in the city to one in 5 miles or even less in the interurban portion. They average four stops per mile in the city, two in the suburbs, and one to one and one-half in every 2 miles of rural track. Hence the power to secure proper acceleration is of considerable importance in maintaining a fast schedule, and attention is given to this point in the motor equipment of the car.

All the interurban cars are of the double-truck type, and a great many of them are equipped with four motors, one on each axle. If the grade exceeds 5 per cent and the rate of acceleration exceeds 1.75 miles per hour per second, four motors per car are found essential to a reliable service. Even where other conditions would permit the use of two motors the dimensions required for the necessary horsepower may be such as to exceed the allowable space, in which case four motors of smaller build but of the same capacity are used. A 6-foot wheel base has been generally adopted for bogie trucks, which, with a 6½-inch axle and a 12-inch bolster, leaves little space for the motor. The wheel diameter is limited in many cases to 33 inches by the required height of the car body. There is a tendency to the use of longer wheel bases, owing to the high speed at which the interurban roads have lately been operating.

The average length of the standard interurban car today is about 50 feet, with a total weight, when equipped, of 25 tons, and with four motors of 50 horsepower, one upon each axle of the double trucks. The air brakes are usually motor driven, but one or two of the lines employ storage air. Many of the cars provide both baggage and passenger accommodations, the baggage compartment being used also as a smoking compartment. All of them are lighted with electricity. Many are heated by hot water, this proving more economical and efficient than direct electrical heating under the conditions involved. In Michigan some of the cars are over 60 feet in length, with high-backed upholstered seats, M. C. B. trucks, and steel tired wheels. Some of the cars on the Columbus, Delaware and Marion (Ohio) Railway Company's line are 66.3 feet over all, being at least 5 feet longer than any other interurban cars built, so far as known. On the same line there are also some handsome 50-foot cars divided into two compartments,

with a seating capacity of 52 passengers. The cost of the car, finished in solid mahogany with extra bronze trimmings and elaborate electroliers, was about \$11,000.

A number of the cars on interurban roads are of the semiconvertible type already referred to in another chapter, while open cars are also in use to some extent. On high-speed roads the ordinary type of open car with outer running board has obvious objections. Those built for the Northern Texas Traction Company have a center aisle with end entrances.

One of the most interesting developments in the rolling stock of these interurban lines has been the construction and equipment of two sleeping cars for use on the Ohio and Indiana long interurban lines. The car is similar in outward appearance to an ordinary parlor or sleeping car, and is mounted on two trucks, each of which is arranged to carry two 150-horsepower motors, giving a total of four motors of 600-horsepower capacity for the car. The interior arrangement is different from that of the ordinary sleeping car. The upper berth is folded up during the day, and the lower berth consists of two revolving chairs, which are swung together at night, the cushions for the berth being obtained from the bottoms and backs of the chairs. The car has a second or false floor built on top of the regular floor, and the partitions all slide down between the double floors in the daytime, working on the same principle as a roller top desk. The berths are 27 inches wide, which leaves 15 inches between the sides of the berth and the partitions of the compartment. The coach is fitted with the regular motorman's cab, controller apparatus, headlight, cowcatcher, etc.

Freight and express service.—For a long time it has been the practice to carry mail matter on street cars. This began with the granting of free transportation to mail carriers with their baggage, and has developed gradually into a service which comprises completely equipped mail cars in which letters and newspapers can be sorted and disposed of. It is a frequent practice to furnish street cars with boxes into which mail matter can be dropped along the route traversed by the car, the mail being collected from the car at the points most convenient to the general post office.

The handling of baggage and freight on street railway lines had a slower development, and is still in its experimental stage. In New York city an express transportation company operates in connection with the Metropolitan Street Railway Company and utilizes several express street cars, which run between designated points at certain hours of the day solely for the purpose of transferring express, baggage, and packages in bulk.

Some of the street railway companies have gone more thoroughly into the heavy freight business, and have provided themselves with rolling stock and freight houses.

But the most extensive development of freight and express business has taken place on the interurban

lines. An illustration of this development is found in the case of the various interurban lines entering Toledo, Ohio, over the tracks of the Toledo Railways and Light Company, with which they have traffic arrangements. The freight cars of these lines run alongside a regular freight house, with a large unloading platform. Six cars can be accommodated at the same time, and there is ample space for drays to load and unload. Freight cars are run at such hours of the day and night as interfere least with the regular schedule of passenger cars. The freight depot is owned by the city company, each interurban company paying a certain rental. The schedules of the several roads using this terminal are so arranged that the freight cars do not reach the station at the same time, and the work is equalized throughout the day. The Lake Shore Electric Railway operates three freight runs or three cars a day each way. It sends out a special meat car every day from Toledo. The Toledo and Monroe and the Toledo and Maumee Valley railways have each two cars each way. The Toledo and Western Railway has two runs out of the station each day. It brings a special milk car into the city every morning. Milk is handled by all the roads named at a straight rate of 1½ cents a gallon for any distance, and milk tickets are sold by the general officers and agents of each company. Special carload lots are handled at special rates, the Toledo station agent being authorized to give carload rates over any of the roads. The minimum charge for any article is 25 cents. The freight station is managed by a committee composed of the general managers of the companies interested; but the business of each road is conducted separately.

Many of the cars on these roads are ordinary freight cars with brake equipment, etc., similar to that on steam railways. A great many of the interurban cars, however, have freight or baggage compartments in the passenger cars. The Steubenville Traction and Light Company handles all its freight in combination cars. The rates are not so high as the express rates, but slightly in advance of the steam railroad freight charges. Out of a total car length over the bumpers of 40 feet 8 inches, the baggage section occupies 11 feet 6 inches, giving space for a large quantity of miscellaneous freight and express.

Many of these roads have developed a regular system of accounting for freight and express service, the system being similar to that followed by the express companies of this country. The Dayton and Troy (Ohio) Electric Railway has its own wagons for express service in the larger stations, but in smaller places it pays 20 per cent of the charges for delivery to the parcel delivery wagons. It has through billing arrangements with the Southern Ohio Express Company, which operates on the Southern Ohio Traction Company's cars, its express rates being considerably under those of the old express companies.



INTERIOR VIEW OF FIRST AMERICAN TROLLEY SLEEPING CAR.

This company has 55-foot freight cars, which make two round trips every day between Piqua and Dayton. The company issues a freight classification, identical with the regular railroad classification, upon which rates are based. Through billing of freight has been arranged for between the lines of several of the traction companies which enter Dayton by a division of the charges and a sharing of the expense.

The Mahoning Valley (Ohio and Pennsylvania) Railway Company operates two closed cars, built especially for freight and express service. There are 3 men on each car—the conductor, the motorman, and a laborer. Freight depots have been located in each city and village through which the line operates, although not all were constructed for this purpose. At Niles, Ohio, a depot has been built especially for freight business in connection with the company's power house; at Girard, Struthers, Lowellville, Ohio, and Newcastle, Pa., the company has buildings of its own; at Youngstown, Ohio, and at Edensburg, Pa., there are freight rooms in connection with the stations. The company does not use combination cars. It is the policy of the management to keep the passenger traffic entirely distinct from the freight business.

The package freight business of the Cincinnati, Dayton and Toledo Traction Company, formerly the Southern Ohio Traction Company, is conducted by the Southern Express Company. When the Southern Ohio

properties were first consolidated the express business was placed in the hands of the Wells-Fargo Express Company under a contract similar to those in force on steam roads. The net returns to the traction company were not satisfactory, however, and the company decided to conduct the business itself. The Southern Ohio Express Company is a distinct organization, incorporated with a nominal capital stock of \$2,500. The traction company furnishes the cars, crews, and power and receives 10 cents per car mile for the mileage of the freight cars. The express company operates two 35-foot freight cars between Cincinnati and Dayton, making two trips each way per day. At the beginning it purchased 30 first-class wagons and teams, sending out numerous solicitors and establishing stations in the leading towns in the territory it intended to occupy. Delivery wagons are maintained in all the leading towns, and in Cincinnati and Dayton the wagons have regular routes, making four trips per day to over 1,500 leading business houses. The company uses the traction company's passenger and terminal stations in Cincinnati, Hamilton, Middletown, Franklin, Miamisburg, and Dayton, paying half the expenses of the maintenance of the station and the salaries of its own agents. The operating expenses of the express company amount to about 75 per cent of the gross receipts. For a time the net loss was large, but for the year 1902-3 it was estimated that the net profits would be about \$10,000.

CHAPTER V.

POWER HOUSES, EQUIPMENT, AND OUTPUT.

I.

POWER PLANT AND GENERATING EQUIPMENT.

The data relating to power plant and electric generating equipment of street railway companies are shown in Table 96. The use of electricity or other mechanical motive power was reported by 764 companies, which returned a statement of 805 power houses, not including substations and companies that purchased their motive power.

As steam was reported by 540 companies as the primary motive power for generating their electric current, it would appear that these companies in some instances embrace a number of subsidiary companies, thus furnishing current for their whole network from plants of a sufficient capacity to care for the necessities of more than one road. The 2,336 steam engines, which are classified in the table according to horsepower capacity, had an average of 556 horsepower per engine. The 1,589 engines, with a capacity of 500 horsepower or under, had a total capacity of 421,051 horsepower, an average of 265 horsepower per engine. The 430 engines having a capacity of more than 500 but less than 1,000 horsepower had a total capacity of 297,257 horsepower, an average of 691 horsepower per engine. The 317 engines of 1,000 horsepower and over had a total capacity of 579,825 horsepower, an average of 1,829 horsepower per engine.

There were 37 companies that reported the direct use of waterpower in their own plants for current generation and that did not sell any such power in the form of hydraulic service or electric current. These companies used 159 water wheels or turbines, with a total of 49,153 horsepower, an average of slightly over 300 horsepower per wheel. There were 129 water wheels of 500 horsepower or under; 12 of more than 500 but less than 1,000 horsepower; and 18 of 1,000 but less than 2,000 horsepower. Of the total horsepower thus reported, 34,215, or 69.6 per cent, was reported by 16 companies in the states of California, Georgia, Maine, Minnesota, and New York. The largest plant of this nature was shown for the Twin City Rapid Transit Company, of Minneapolis, Minn., which reported the use of 12 water wheels, 10 of which were of 1,000 horsepower each. It should be borne in mind, however, that other than that included in the table, waterpower is extensively used

for the operation of street railway companies. A notable case is that found at Niagara Falls, which may be taken as typical, and which not only generates current directly for the local street railway network at the Falls, but which also transmits an immense amount of power some 20 miles to Buffalo, where it is manipulated and employed on a large scale for the propulsion of the cars of the Buffalo systems, as well as the cars of the inter-urban system between the two points. Detailed statistics of water wheels will be found in Supplementary Table 3, which also presents the details for the gas engines employed in the main generating plants.

It appears that 15 gas engines, of a total of 1,925 horsepower, were employed. Three of these, with a total of 1,000 horsepower, were located in the state of Pennsylvania, and 5, of a total of 400 horsepower, in Illinois. These two states alone account for nearly 75 per cent of the capacity reported. The power plant statistics in Table 96 include also 301 auxiliary steam engines, of a total capacity of 10,074 horsepower, which were used by 84 companies for miscellaneous purposes, such as driving pumps, etc.

The power plants referred to in Table 96 reported a total of 3,853 boilers, with an indicated capacity of 893,205 horsepower, the average capacity per boiler being 232 horsepower. In a general way the approved practice is to have a boiler capacity larger than the engine capacity and an engine capacity larger than the generator capacity, thus providing a liberal factor or percentage of safety over unavoidable losses. The figures in Table 96 would indicate an apparent departure from this practice, but the departure is more apparent than real. As a matter of fact, the boiler capacity would usually be found quite adequate for the work it is required to do. Many power houses have dynamo and engine capacity in duplicate or in reserve to provide against a possible breakdown of any unit, or for changing the load from one set of apparatus to another, according to the demands at different hours of the day, although the same boilers remain in active service all the time.

The statistics for the number and horsepower of dynamos driven by steam engines, gas engines, and water wheels, respectively, are given in Table 96. The table shows a total of 3,302 dynamos of all kinds, with a total capacity of 1,204,238 horsepower; in round num-

bers, about 900,000 kilowatts. The 2,861 dynamos of the direct current type had a total capacity of 972,314 horsepower, and the 441 alternating current dynamos a total capacity of 231,924 horsepower. It appears, therefore, that the direct current apparatus furnished nearly 81 per cent of the total capacity. Of the direct current dynamos, 2,324 had a capacity of 500 horsepower or less, with a total of 422,924 horsepower; 328, more than 500 but less than 1,000 horsepower capacity, with a total of 218,934 horsepower; and 209 had a capacity of 1,000 horsepower and over, with a total capacity of 330,456 horsepower. The use of small machines evidently predominates, as more than three-fourths of all the machinery was rated at 500 horsepower or under, and the capacity of such dynamos was 43.5 per cent of the total for direct current. Supplementary Table 4, which supplements Table 96, in regard to the distribution of alternating current dynamos, shows that this form of dynamo was employed by 163 companies. Of this number 128 reported that they also generated current for sale for light and power, thus indicating the use of these generators on a wide range of service, quite aside from and additional to that in the street railway field. The 441 alternating current dynamos had a total capacity of 231,924 horsepower, an average of 526 horsepower per dynamo. Three hundred and twenty-nine of these machines were of 500 horsepower or under, with a total capacity of 61,935 horsepower; 54 were of more than 500 but less than 1,000 horsepower, with a total of 36,418 horsepower; and 58 were of 1,000 horsepower and over, with a total capacity of 133,571 horsepower. It appears, therefore, that the alternating current dynamo reversed the conditions in regard to direct current, and that the 58 dynamos of the larger size, or only 13 per cent of the total number, have 57.6 per cent of the total capacity.

Location of power house.—The electric railway power house and its equipment and the methods adopted for delivering current to the line, are among the most important subjects embraced within this report. Although the conditions of operation and the nature of the apparatus employed have changed in a most radical and revolutionary way since the first trolley car went into successful operation, certain fundamental principles still, and will probably always, apply to the location of the power plant itself, although it is by no means sure that the substations will remain as they are, either as to location or as to equipment, or even as a continuing necessity.

The considerations governing the location of the central power house are primarily those connected with the supply of fuel or juxtaposition to the waterpower by which the generators are to be driven, and next to these considerations may be said to come the supply of water for the boilers and the disposal of ashes. Hence, in a great many places, it has been found desirable to place the power plant near the railroad tracks over which its coal supply must be transported. In towns

of smaller size and on interurban roads the governing consideration is not centralization, but is to be looked for rather in convenience of access to the coal or water supply. The location of the power house has, moreover, been rendered of less vital importance than formerly by the general adoption of the plan of having substations, a practice which naturally makes for flexibility. The substation itself is the outgrowth of the widespread use of alternating current machinery instead of direct current generation.

The well-established limits to the economic distribution of direct current at the ordinary voltages for street railway work—say, between 450 and 550 volts at the motors—do not exceed 10 miles, although longer distances have been covered. A great many electric railway systems far exceed such a length either in total mileage of track within a limited area or in the continuous stretch of a line in some given direction; but if the power plant be direct current, and be located midway of the line of road 16 to 20 miles long, it is advantageously disposed with regard to its work, and can feed current economically to cars even at the two termini. When, however, roads are from 50 to 100 miles in length, the substation becomes a necessity, if the current is to be distributed from one central power house. The high-pressure alternating current has been found in practice, during the past ten years, to be equally desirable for current distribution in cities where every inch of traction is well within the limit at which direct current could be furnished economically to the cars from a central power house. The principal reason for this is that the use of the alternating current enables the power houses to be centralized and reduced in number. Indeed many engineers believe that with alternating current motors on the cars substations will disappear, or at least will be so modified as to their functions that the location of the power house may have to be determined upon other grounds and arguments than have heretofore applied. If this belief is well founded, the practice of using substations will have proved a short lived one. But it may be pointed out that the literature of the industry ten years ago is virtually bare of reference to alternating current supplied to substations. For a time, and even at the period in the art under discussion, boosters for maintaining voltage at remote points on the system offered a temporary solution of the difficulties encountered in direct current supply. The recent advent of alternating current, however, has so changed the outlook and the conditions that the uneconomical booster is no longer considered as a serious factor. In the earlier days the question of determining the best location of the station might be governed by the fact that, in order to attain cheap fuel or a cheap water supply, the gain in this direction might be offset by the increased investment in feeder construction. Here again resort to the alternating current has modified the principles which governed within the decade.

A few figures compiled by Mr. A. B. Herrick, bearing upon these points, may be cited as of general interest:

Take, for example, a 15-mile stretch of road with cars uniformly placed, requiring 20 amperes per mile average and 40 amperes per mile maximum, and assume 20 per cent drop in voltage on $7\frac{1}{2}$ miles of road. With the station centrally located the copper will cost about \$20,000. If the station is 2 miles from the center of distribution the installation cost for copper will be increased \$6,700. Property in the central location would, therefore, be worth this much more to the railway company, as better distribution could be obtained from a station on that site.

Where the coal can be delivered directly from the cars to the coal bins of the station the cost for handling is at the lowest. Where there is any rehandling the price depends upon the distance traversed. To load and move 1 ton 1 mile or less costs about 25 cents per ton; $1\frac{1}{2}$ miles, 30 cents; 2 miles, 32 cents. These figures are taken from average prices paid for hauling over a variety of roads. A station with the capacity mentioned above would require, on an average, about 11 tons of coal per day. If hauled 1 mile this would cost per year, with shrinkage in coal weight due to moving, about \$1,000, or 6 per cent on an investment of \$16,666.

The value of condensation in a street railway plant of the size cited above can be roughly estimated at 18 per cent saving in coal. At \$2.80 per ton this would be \$2,023 per year, or 6 per cent on an investment of \$33,700. This station would take about 700,000 cubic feet of water per annum for boiler use. If the water had to be bought at, say, \$1 per 1,000 cubic feet a site would be worth \$11,600 more where free water could be obtained.

Construction of power houses.—The electric railway power houses enumerated in this report are almost universally built of brick with stone trimmings, and are usually of a most substantial character. They are sometimes quite ornate in appearance. Of late steel framework has been largely resorted to in their construction. It is a common and advantageous plan to divide the building into two main portions, one occupied by the boilers, the other by the engine or dynamo. In some cases the power plant is associated with the car barns and even with the general offices of the company. In some plants the building, instead of being laid out on one floor at the street level, is two or three stories in height, with the various steam and electrical departments imposed one upon another. The determining consideration in this matter of height is usually the cost of real estate.

The building requirements laid down by insurance companies for rating risks on electric light and power stations indicate, in detail, what would be generally regarded as the best present day practice in such construction. The regulations and restrictions embody the following features:

Walls: Brick or stone, at least 8 inches in thickness for a one-story station, and 4 inches to be added for each additional story; or iron, to extend at least 3 feet above roof. Height: One story, without space below. Area: Not over 5,000 square feet of ground between standard fire walls. Roof: Metal, with metal trusses and supports. Floor: Brick, cement, stone, or earth. Wooden platforms may be used about machines. Cornice: Brick, stone, or metal. Eaves: Not less than 15 feet from ground. Finish: No combustible finish or finish leaving concealed spaces. Division walls, if any, to be of brick or stone, with standard fire doors or

shutters. Partitions about offices, storerooms, or elsewhere to be of noncombustible material. Boiler, except in standard station, to be outside or cut off by standard fire wall, with standard fire doors and shutters. Roof of boiler house to have proper ventilator. Stack: Brick, or if iron, to be outside and on brick foundation. Wire tower, if any, to be brick or stone, with same kind of roof as station proper. Stairs, if any, to be properly inclosed when deemed necessary. Elevators, if any, to be in brick tower, or with self-closing hatches. Heating to be by steam, hot water, or hot air by blower system; piping for same to be free from woodwork and supported by iron hangers. Stoves may be used in office only. Lighting to be by gas, with brackets so arranged as not to allow flame to come in contact with woodwork; or by electricity, with wiring in accordance with rules. Occupancy to be only for legitimate uses of the station itself. Exposure: Must be unexposed to other hazards within 50 feet; or, if exposed, to have approved fire walls on exposed sides.

Equipment of power houses.—At the beginning of the ten-year period which closed with the year of the special investigation, steam generating plants were usually equipped with sectional tubular boilers similar to those in most modern plants, and many other features of construction and equipment were not greatly dissimilar to those of to-day. The great power plant of 1902 differs most strikingly from the older plant in its more general use of automatic machinery of all kinds for bringing coal to the boiler fronts, for stoking the fuel upon the grates, and for disposing of ashes. The generating plants in 1892 usually consisted of a number of small units leather-belted directly to the steam engines, sometimes even with the intervention of countershafting. Direct connected engines and dynamos were rare. Most of the engines at that time, therefore, were of high speed; and the dynamos or electric generators were of the bipolar type. The engines were frequently simple in type, and even when compounded were often run noncondensing. The bipolar generators, though wound for the higher voltages—e. g., 500 volts—even then becoming the standard on street railways, were of the general type designed for electric lighting, and were not particularly well adapted for the purposes intended. The water wheels now in use in electric railway power houses do not differ greatly from those of 1892, except that it has been found necessary to adapt them to generating plants of the long-distance power-transmission type. In 1892, however, the heads under which the water wheels operated were far less efficient than those of 1902, and the requirements were in every respect less exacting, the units, moreover, being much smaller.

In the modern plant much care and thought are given to the classifications and specifications applying to the equipment, especially the huge generators and steam engines, or turbines. The engine and generator specifications, for example, must be in harmony so far as capacity, speed, and regulation are concerned. It is the general practice of manufacturers of generating dynamos to give their machinery a nominal rating, which allows for 25 per cent, 50 per cent, or even 75 per cent overload for certain periods of time ranging

from ten minutes up to two hours or longer. The engine built to drive direct or continuous current generated in this class of work is designed for rapid changes of speed and output, for certain changes in the load and for close regulation. What would be considered ideal regulation in a direct current plant, however, would hardly be satisfactory with alternating current generators. There is no great difficulty in running two or more direct current generators together on the same circuit, and in dividing the load so that each does its share of work; but in running alternating current generators, particularly at slow or medium speeds, the problem is different, and calls for other conditions of design.

The engineering societies of the country, such as the American Institute of Electrical Engineers, and the American Society of Mechanical Engineers, have formulated general rules bearing upon these points, and established certain standards for direct connected generating sets of machinery. As to the general practice throughout the country at the time of this report, some interesting variations in practice may be noted.

Direct current generators are still retained in a few of the larger cities, such as Boston, Mass., where the Boston Elevated Railway Company, operating both surface and elevated lines, has continued to use direct current and has erected a number of small stations instead of concentrating its power in one or two large ones. Thus the company reported 8 power plants in 1902. It is interesting to note that while the original power plant of this system had a few years ago 36 small generators, each one of only 50-kilowatt capacity, the company now has 5 generators, each of 2,700-kilowatt capacity. About 20 per cent of the capacity of the company's stations is used for supplying the elevated lines and 80 per cent for the surface lines. In Chicago, Ill., also, the street railway companies were still supplying their lines from direct current power plants, some of the apparatus belonging to the earlier stages of the art, with simple engines and rope driven generators, but the new work contemplated brings the engineering in the street railway field in that city up to date. In Cleveland, Ohio, Indianapolis, Ind., and to a large extent Milwaukee, Wis., direct current generation continues to be the standard usage.

In Minneapolis and St. Paul, Minn., the Twin City Rapid Transit Company has had the advantage of a waterpower of about 7,500-kilowatt capacity, but the growth of business has necessitated the addition of a steam plant whose ultimate capacity will be 21,000 kilowatts. The system is alternating current, 3-phase, the waterpower plant being about midway between the two cities, and the station voltage is 3,450-volts 3-phase, at which pressure current is transmitted to the substation in Minneapolis. In transmission to St. Paul the voltage is raised to 13,000. At both points the current is, of course, "stepped down" and converted in the

usual way for use on the cars, the substations having storage batteries. At Philadelphia, Pa., the three principal power houses have been direct current, but a change is being made to 3-phase alternating. The same is true of Pittsburg, where the Pittsburg Railways Company has heretofore operated no fewer than eight direct-current stations. In San Francisco the United Railroads have had five direct current power plants in operation, but have been making a change to alternating current for generating and transmission. St. Louis affords, probably, the most important example in this country of direct current street railway power plants, with its enlarged station at Park and Vandeventer avenues, having an output of 30,000 amperes. The alternating current has now, however, penetrated into this territory for use in the outlying part of the company's system.

It will be seen from the foregoing facts that the direct current plant is still regarded as modern, economical, and efficient, and is largely in use, though not what the French would call the "dernier cri."

In August, 1903, at the time when the compilation of the statistics in this volume was approaching its conclusion, alternating current stations for supplying a large proportion of the load were in use or under construction in New York, Kansas City, Baltimore, and San Francisco. Combination direct and alternating current plants, where the direct current is used to supply what may be termed the inner circle, while the outlying regions are operated with the aid of the transformed and converted alternating current, were in use in Brooklyn, Denver, Milwaukee, Philadelphia, Pittsburg, and St. Louis. The large use of waterpower at Minneapolis and St. Paul in connection with alternating current has already been noted. In Buffalo the power plants for street railway work consisted largely of substations for that part of the current generated at Niagara and transmitted by 3-phase lines, partly overhead and partly underground.

It has been stated by many authorities that there is considerable difference between the lay-out, or plan, of a large alternating current station, in which nearly all the power for supplying the system is concentrated, and the plan of smaller direct current plants. This is due partly to size and partly to the fact that the concentration of an immense amount of generating apparatus under one roof makes interruption of service much more possible and serious than where a number of scattered stations feeding into the common network are in operation.

The plan of isolating one section of a station from another is now being very thoroughly carried out in large plants. For example, in the large alternating current stations special provision is made for the isolation from each other of high-tension bus-bars in brick and stone insulating cells, and for the segregation of the generators into individual groups, so that trouble

with one group can not affect the others. As interruptions are also to be feared from the steam piping and boiler room, the prevalent practice of connecting large generators, engines, and boilers, in parallel permanently, on the same bus-bars and steam pipe lines, has been abandoned in the best modern power houses. It is evident that, with the introduction of units of 5,000 kilowatts and upward, the permanent united operation of the entire station is not necessary, as it is with the smaller units. A study of the latest designs shows that in stations with such heavy units, each unit with its boilers becomes a section of the station by itself; capable of being operated in parallel with other units, but only through the medium of steam piping and electrical connections, which can be quickly cut apart. In steam piping, companies now use quick-acting electrically-operated valves, thus avoiding the danger heretofore always present in the older systems, due to the fact that essential valves could not always be reached in case of accident.

Another feature which has required careful attention on account of mining strikes, has been the storing of coal. It is most essential that there should be adequate storage room for emergency supplies, and, moreover, engineers have been obliged to devote a great deal of thought to the design of a plant whose coal supply may have to be received by rail instead of by water.

Very recently the steam turbine, which is now to be found in several plants, has, also, claimed consideration. Where companies introduce a steam turbine, radical changes from the usual design are necessary, as the boiler room must be larger, in proportion to the generator room, than in an engine driven plant. The general plan of the few large steam turbine street railway power houses that have been designed is to place boilers on both sides of the generator room. One notable exception to the rule is the plant of the Commonwealth Electric Company, in Chicago, where the boilers are placed only on one side of the generator room, and are all on the ground floor. Although the plant is operated for lighting and for stationary motors, and not for street railways, the principle here followed is approved for both fields of work.

Kingsbridge power plant.—The latest and one of the best illustrations of street railway power house construction and equipment is the Kingsbridge power plant, built for the Third avenue division of the Metropolitan Street Railway (Interurban) Company of New York. This plant was built before the statistics in this volume were compiled, but it was not equipped and operated until somewhat later. The interior of the plant is shown in the accompanying illustration.

The plant has sixteen 3,000-kilowatt units located in two rows of eight each, in an engine room parallel to the boiler house, which contains two tiers of boilers. The entire structure is 320 feet long and 244 feet wide. The engines are arranged in the usual way on each side

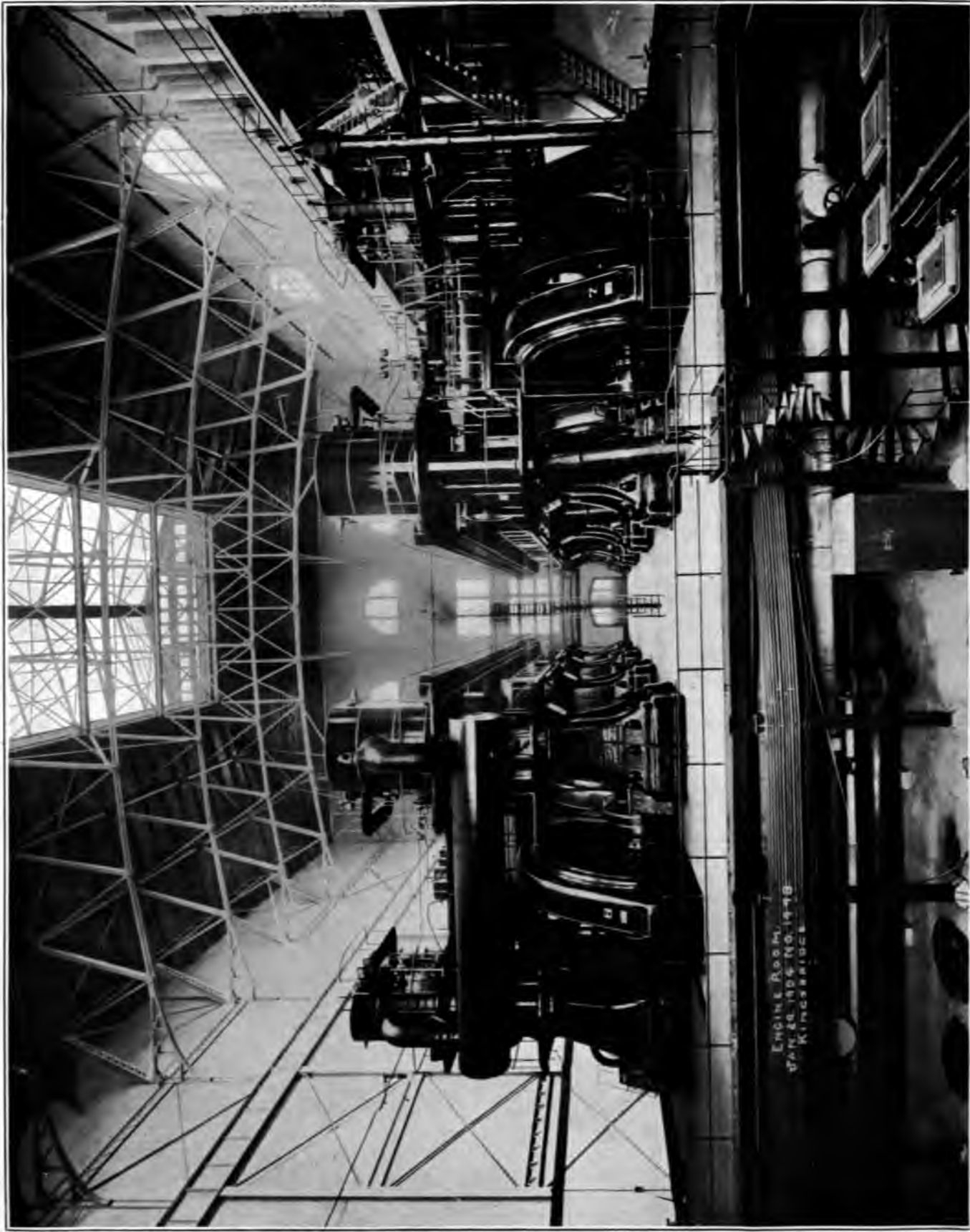
of a center aisle, and the boilers are in batteries facing each other on each side of the fire room. This plant has also a wide transverse aisle running crosswise of the house, which, with the longitudinal passageways, virtually separates the plant into four sections. Just inside of the boiler wall in this transverse passage are placed four large barometric condensers, each serving one-quarter of the plant, and any three of them capable of serving the whole plant.

Each quarter of the boiler house has an independent smokestack; but the flues leading to the four stacks are so connected that the gases from one-quarter may be forced to any other, enabling one stack to relay another if, for any purpose, this should be necessary. Economizers are placed in the flues, and the 200-foot stacks, yielding sufficient natural draft for ordinary service, are reinforced by supplementary mechanical draft, by which the effective height of the stacks may be increased to about 400 feet when desired. It will be seen, therefore, that each quarter of the boiler plant is provided with its own stack, economizers, and mechanical draft. Moreover, each quarter is so connected to four of the engines driving 3-phase alternators as to serve primarily one-quarter of the engine room, which, in turn, is connected by suitable exhaust to a condenser large enough for four units. The station may, therefore, be considered as consisting of four independent plants, so connected that they may operate as one entire system, or may be sundered into divisions of two or four as operating conditions may require.

In general design, spacing, and operating characteristics, this station is so laid out that while there is ample room for all required purposes there is no space wasted, the result being that the station covers just 1.11 square feet per horsepower of generating apparatus.

The auxiliaries of the station are, in the main, steam driven, the auxiliary exhaust being utilized to heat the feed water prior to its discharge to the economizers. Ample oil circulating systems are provided, with filtration; and the usual complements of service for coal handling, cold storage, ash handling, etc., are amply provided.

The building is of a very substantial character, and rests upon a substructure of some 18,000 piles, capped with 6-foot monolithic slabs of concrete. The steel framing is somewhat more substantial than is usual in structures of this class, and the building throughout is of a high character. Architecturally, it is of pleasing appearance, plainly, but very substantially finished. The plant as a whole probably represents the highest type of design and construction within the class to which it belongs, particularly in respect to the proportions introduced into the general design, the sufficiency covered in the details, and the care and fidelity with which the construction has been uniformly sustained in keeping with the intent of the design. Among its interesting features, not usually found in power plants,



TYPICAL INTERIOR, MODERN TROLLEY POWER HOUSE, KINGSBRIDGE, NEW YORK CITY.

are the methods provided for handling the engines from a single point on the upper platform, the large central condensing plant, and the relation of the condensing plant to the grouped main units.

Another accompanying illustration is an exterior view of the Pratt street power plant, which supplies current to the Baltimore trolley system. The notable feature in connection with this building is its location at the water's edge, permitting the receipt of fuel direct from ship or barge by a most elaborate and effective system of conveyance.

II.

SUBSTATIONS.

The function of the substation is to distribute the current which the main power plant generates. The growth of the system of generating polyphase, alternating current at one central point, has made substations necessary in different parts of the territory, which receive on "step-down" or receiving transformers this current transmitted over single wires or cables at high pressure. The current passes from these transformers as alternating current of low pressure and is received by rotary converters, a species of the composite double-wound dynamo, at the collector rings, and delivered at the commutator on the other side as direct or continuous current at the normal pressure or voltage used on street railway motors, namely, 500 to 550 volts. This direct current either goes out to the section of the line fed by the substation or is stored up in storage batteries located at the substation.

According to the data given in Supplementary Table 6, the substation equipment of the 105 companies included in the report embraced 926 transformers of 221,459 horsepower, exclusive of 14 for which the horsepower was not reported; 358 rotary converters of an aggregate capacity of 186,688 horsepower, exclusive of 8 for which horsepower was not reported; 20,960 storage battery cells of a reported horsepower of 39,249, the capacity of 1,080 cells not being reported; and 40 miscellaneous machines of 6,235 horsepower, exclusive of 3 for which the horsepower was not reported.

A very large proportion of this equipment is to be found in New York city, where the largest substations are those in connection with the plants of the Inter-urban or Metropolitan Street Railway system and the Manhattan Elevated Railway.

Manhattan (elevated) system.—The main power station of the Manhattan system is located on the East river between Seventy-fourth and Seventy-fifth streets, while the seven substations for delivering the current received from it are located in different parts of the city. Illustrations of some of the substations on this system are here presented.

The Manhattan elevated substations are generally 50 feet wide by 100 feet long, and have four floors above the basement, the two upper being reserved for storage

batteries. The lower floor contains the rotary converters set on concrete foundations. The second floor, in the form of a gallery, contains the substation switch-board and the alternating current transformers, familiarly known as the "statics." Between the galleries a 25-ton crane traverses the space over the converters, the gallery being served by 5-ton cranes. The buildings are of steel construction so designed that the inner columns will carry the heavy loads, thus permitting a symmetrical spread of the large foundations required. The floors are of concrete construction. The battery rooms are paved with vitrified brick laid in asphaltum. All the buildings are provided with electric elevators.

The Manhattan Elevated, while possessing its due proportion of transformers and rotary converters in substations, reported only a small number of storage batteries. The system depends almost entirely upon live current as distinguished from that which is stored up. In this particular there is opportunity for difference of practice between electric railway operations and electric lighting. It would be impossible for a company doing a commercial lighting and stationary motor business to depend upon live current, the supply of which must be renewed incessantly by the generators without any reserve or precautionary measures against breakdown or sudden stoppage. Hence, the storage battery is a vital and essential part of the electric lighting system. In transportation, however, the storage battery is not indispensable and the Manhattan Elevated Company has preferred to rely entirely upon live current.

III.

POWER—CONSUMPTION OF, AND COST.

In a preceding section of this chapter attention has been given to the general statistics of power plant equipment. It is only with regard to electric railways that information as to power production and consumption in the operation of street car lines has been broadly available, or is of value in a technical sense. There are, however, many aspects under which the question of power is of interest to the public, aside from the *modus operandi*, or the manner in which transportation is facilitated, or the degree to which the form of traction affects the relative congestion of thoroughfares by cars.

For example, according to the statistics which were carefully compiled for several years by the Metropolitan Street Railway Company, of New York, at a time when it had the three systems of animal power, cable, and electric railway, in full parallel operation, it was shown that the benefits to the company were at least equal to those derived by the community at large. During the year 1900 these motive powers were all in use on the best streets for the same kind of traffic, and with a traffic density on the cable and electric lines not greatly differing. Reasons were thus furnished in

a practically conclusive manner for the abolition of the cable service, and its entire supersession by electricity. It was also shown that animal power traction is almost universally found uneconomical. It appears from the figures, which were compiled by the Metropolitan Street Railway for its own information, that the percentage of operating expenses to gross earnings in 1900 were 40.5 per cent for electric, 51 per cent for cable, and 73.6 per cent for animal power lines. The profit per car mile was 19.38 cents for electric, 17.10 cents for cable, and 6.82 cents for animal power lines. The superior economy of the electric systems, however, is not fully expressed by these figures. The car-mile unit is different in each case. The old horse car would seat only 16 to 20 passengers, and the cable car about 28; while nearly all the electric cars, at the time of the analysis, would seat from 30 to 50. The cost per passenger carried was 2.02 cents for the electric cars, 2.55 cents for the cable cars, and 3.67 cents for the horse cars. A slight modification of the natural conclusion from these figures must be made, owing to the fact that the cable cars had the advantage of a somewhat denser traffic, while the horse cars were under a disadvantage in having a less average density of travel to deal with than either the cable or electric.

These figures were last published in 1901, by which year the system of the Metropolitan company had been so generally electrified that there was no longer any particular object in going to the expense of making an elaborate study of the comparative results. The advantages of electricity, as well as the greater flexibility of the system, had by that time been demonstrated beyond all doubt. The great main artery of travel—Broadway—had been converted from cable to electricity, so that its figures during the year reported were wholly in the electrical class. It was shown during 1901 that mechanically, the Metropolitan electrical system was operated .09 of a cent per car mile cheaper than in the previous year. This reduction appeared entirely in the cost of fuel and labor, both being due to the employment of larger generating units in the new power house which the company has put into operation.

Power plant capacity.—Before taking up the question of the consumption of current per car mile, etc., it is interesting to study the statistics for power plant capacity which are given in Tables 87 and 88 for companies without and with commercial lighting, respectively, that use steam exclusively to drive their generating dynamos.

TABLE 87.—POWER PLANT CAPACITY, RAILWAY COMPANIES WHICH DO NOT SELL CURRENT, CLASSIFIED ACCORDING TO POPULATION: 1902.

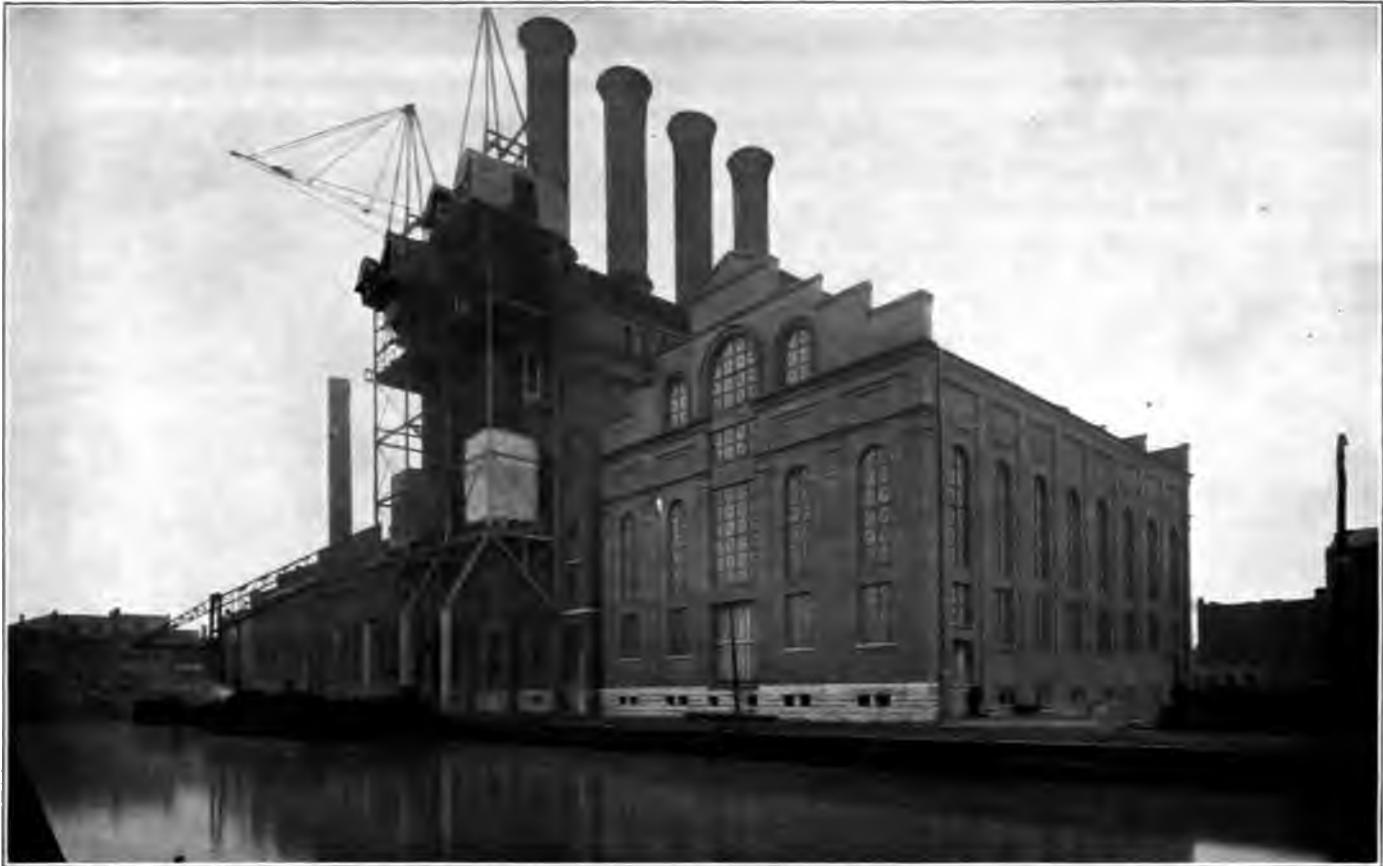
	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of street railways using steam exclusively	221	15	12	25	50	31	88
Number of cars	16,771	5,969	3,778	2,256	836	1,167	2,746
Generator capacity in horsepower	366,301	112,832	64,048	42,075	19,133	56,030	72,183
Engine capacity in horsepower	394,967	122,630	66,283	47,765	20,048	62,630	75,611
Boiler capacity in horsepower	298,394	84,975	49,707	34,275	17,597	47,413	64,427
Generator capacity per car, in horsepower	21.8	18.8	17.0	18.7	22.9	48.0	26.3

TABLE 88.—POWER PLANT CAPACITY, RAILWAY COMPANIES WHICH SELL CURRENT, CLASSIFIED ACCORDING TO POPULATION: 1902.

	Total.	URBAN CENTERS, POPULATION.				INTERURBAN RAILWAYS.	
		500,000 and over.	100,000 but under 500,000.	25,000 but under 100,000.	Under 25,000.	Fast, long.	Other.
Number of street railways using steam exclusively	185	8	13	23	84	13	49
Number of cars	15,522	3,714	3,573	1,896	1,622	566	4,151
Generator capacity in horsepower	378,046	51,031	82,238	49,610	62,857	23,152	109,163
Engine capacity in horsepower	402,270	57,800	86,165	57,805	60,830	24,555	115,115
Boiler capacity in horsepower	279,660	31,020	57,465	38,385	55,071	17,340	80,379
Generator capacity per car, in horsepower	24.4	13.7	23.0	26.2	38.8	40.9	26.3

It will be seen from Table 87 that 221 street railway systems whose current was employed exclusively in street car operation, with 16,771 cars in operation, had a generating dynamo capacity of 366,301 horsepower, an average per car of 21.8 horsepower. In cities above 25,000 population the generating capacity per car varied very little, being 18.8 horsepower per car for the larger cities over 500,000 population; 17 horsepower per car

in cities between 100,000 and 500,000; and 18.7 in cities of between 25,000 and 100,000. In a group of 50 systems in communities with a population under 25,000, and with only 836 cars, the generating capacity rose to 22.9 horsepower, indicating the relatively greater inefficiency which necessarily attends the operation of a very small system, as compared with a larger one. It is not to be understood, however, that all this provision



TYPICAL WATER SIDE STREET RAILWAY POWER HOUSE. BALTIMORE, MARYLAND.



MANHATTAN ELEVATED RAILWAY STATION AND POWER SUBSTATION, NEW YORK CITY.

per car was necessarily called upon at one and the same time, or was required all of the time, although there may be busy hours of heavy load when all the machinery is called upon to take its share of duty. It is important to point out in this connection that the interurban lines, of which 31 are specifically considered, have provision per car much greater than in the cities.

The fast, long interurban lines, with 1,167 cars, had a total generating capacity of 56,030 horsepower, an average per car of 48 horsepower. This is very nearly three times as much as the provision made in urban centers of between 100,000 and 500,000 population. There are two chief reasons for the great difference. One is the heavier weight of the modern interurban car, as well as the large amount of bulky freight and express business now carried by them; and the second is the fact that, as a large proportion of the interurban plants are of recent construction, the power stations would almost invariably be equipped with a generating capacity considerably beyond the immediate requirements of the road. While it is comparatively easy to add to the rolling stock at need, it is a much more difficult and costly performance to enlarge a power plant, and add new engines, boilers, and dynamos.

No attempt has been made in preparing Table 88 to distinguish the proportions of current going to the various services. The 185 electric railways included in the table reported 15,522 cars and a total generating capacity of 378,046 horsepower—an average of 24.4 horsepower per car. This average is only 2.6 horsepower greater than the average shown in Table 87 for the companies that do not sell current. It might, on a priori grounds, be suggested that companies selling current could operate more regularly and more nearly at the point of maximum efficiency, and that therefore the generating capacity per car required from their plants would not be increased by an amount proportionate to the increase of business done. Thus, it might be possible for some companies to sell current from a plant having no greater capacity than would be necessary for the operation of its cars during rush hours. But it can hardly be said that the statistics in Tables 87 and 88 either confirm or weaken such an inference. The slight difference shown for the two classes of companies in the country as a whole would seem to be confirmatory; and the fact that an actually lower average is shown for the three companies with lighting plants in cities of 500,000 and over would seem to add even greater plausibility to the inference. But against this has to be set the fact that in cities of fewer than 25,000 inhabitants, where a large majority of the companies with lighting plants operate, these companies show an average generating capacity nearly 70 per cent greater than is shown for the other class of companies. So many other forces are operative in

determining the figures in the two tables that it would probably be unwise to attempt any generalized conclusion from them as to the relative efficiency of the two classes of street railway electric plants.

In the case of interurban railways, again, the companies selling current report a lower generating capacity per car than do the companies that sell no current. It would probably be an utterly unsafe inference to conclude that the difference in favor of the companies that sell current is due to the possibility of working under conditions of superior efficiency. Date of construction and conditions of operation have evidently exerted a preponderating influence. Table 89 deals with the current consumption of a group of 307 selected electric railways, and does not include any roads that buy or sell power, so that the figures are as free as possible from complications of that character, although, incidentally, they include a certain but small amount of car mileage due to freight, mail, express, and other services.

These roads reported a power consumption of 1,048,799,599 kilowatt hours; operated a total of 491,023,555 car miles, and carried 1,936,860,800 passengers. This gives a power consumption per car mile of 2.14 kilowatt hours, and a traffic of 4 passengers to the car mile run. This is a very fair average of traffic on such power consumption, although, as will be seen, the table shows some very wide variations, not altogether explicable on the surface. Thus, for instance, Maryland reported one of the largest consumptions of power per car mile, 7.68 kilowatt hours. This is not due probably to the density of the traffic, 7.3 passengers per car mile, for power consumption does not increase proportionately with increase of traffic, but is due rather, as is the high traffic figure itself, to the very small car mileage. Vermont, whose figures for power consumption per car mile are the highest in the table, 8.67 kilowatt hours, has a mileage of only 145,591 car miles and difficult operating conditions, because of the hilly nature of the country and the long and severe winters. The state of Alabama, with only 0.68 kilowatt hours per car mile, has the smallest power consumption of all the states, but West Virginia shows better operating results with a power consumption of 0.72 kilowatt hours per car mile, 3,167,015 car miles run, and a traffic of 3.9 passengers to the mile. To take a single large system for illustration, the Union Traction Company, of Philadelphia, whose system is entirely electric, reported a total of 325,801,963 passengers carried, a car mileage of 59,721,423 miles, and a power consumption of 104,222,363 kilowatt hours. These figures give 5.5 passengers per car mile, and a power consumption of about 1.75 kilowatt hours per car mile. This is a fairly typical figure for a road with heavy and dense traffic and with cars of good size operated over tracks in normal condition.

TABLE 89.—POWER CONSUMPTION, SELECTED ELECTRIC RAILWAYS, BY STATES: 1902.

STATE OR TERRITORY.	Number of rail-ways.	Kilowatt hours.	CAR MILEAGE.			Passengers carried.	Power per car mile in kilowatt hours.	Passengers per passenger car mile.
			Total.	Passenger.	Freight, mail, ex-press, and other.			
United States.....	307	1,048,799,599	491,023,555	487,217,352	3,806,203	1,936,860,800	2.14	4.0
Alabama.....	1	216,445	316,095	313,380	2,715	780,200	0.68	2.5
Arizona.....	1	459,900	255,500	255,500	.....	750,000	1.80	2.9
Arkansas.....	2	630,810	225,437	224,857	580	332,367	2.80	1.5
California.....	8	25,242,199	16,384,206	16,296,572	88,634	52,654,040	1.54	3.2
Colorado.....	1	11,600,000	6,393,755	6,393,755	.....	30,910,210	1.81	4.8
Connecticut.....	10	37,334,257	12,216,040	11,851,028	365,012	44,228,633	3.06	3.7
Delaware.....	3	7,730,899	3,006,798	2,969,238	37,560	9,956,569	2.57	3.4
District of Columbia.....	2	21,333,645	11,920,796	11,870,385	50,411	46,085,925	1.79	3.9
Florida.....	1	492,750	385,988	385,988	.....	998,290	1.28	2.6
Idaho.....	1	219,500	164,250	164,250	.....	314,340	1.34	1.9
Illinois.....	20	76,309,232	34,383,702	34,310,602	73,100	107,962,880	2.22	3.1
Indiana.....	16	44,774,563	17,826,239	17,686,739	139,500	57,066,001	2.51	3.2
Iowa.....	8	12,157,823	6,529,398	6,409,032	120,366	21,366,872	1.86	3.3
Kansas.....	5	1,872,048	1,362,307	1,362,307	.....	4,336,697	1.37	3.2
Kentucky.....	7	18,414,198	13,434,969	13,409,024	25,935	50,826,055	1.37	3.8
Louisiana.....	3	24,737,875	17,024,959	17,024,959	.....	50,678,573	1.45	3.0
Maine.....	7	13,061,470	4,862,065	4,782,977	79,088	19,346,697	2.68	4.0
Maryland.....	2	864,783	112,648	66,740	45,908	487,756	7.68	7.3
Massachusetts.....	31	126,316,167	67,867,134	67,597,249	269,885	311,918,174	1.86	4.6
Michigan.....	12	70,473,835	26,554,412	26,010,537	543,875	95,717,676	2.65	3.7
Minnesota.....	1	3,374,391	2,258,884	2,258,884	.....	9,178,517	1.49	4.1
Missouri.....	4	99,918,577	33,867,907	33,553,346	314,561	135,704,075	2.95	4.0
Montana.....	1	1,669,510	807,380	766,500	40,880	4,731,000	2.07	6.2
Nebraska.....	1	10,333,150	5,007,074	5,007,074	.....	18,540,000	2.06	3.7
New Hampshire.....	4	1,868,373	1,120,067	1,119,799	268	3,272,735	1.67	2.9
New Jersey.....	10	11,258,793	6,242,055	6,226,081	16,024	23,086,234	1.80	3.7
New York.....	39	54,518,421	21,371,491	21,066,843	314,648	72,467,958	2.55	3.4
Ohio.....	36	141,903,196	68,057,788	67,360,472	697,316	232,958,540	2.09	3.5
Oregon.....	1	438,000	140,416	140,416	.....	300,000	3.12	2.1
Pennsylvania.....	42	173,727,592	85,108,240	84,720,569	382,681	422,890,265	2.04	5.0
Rhode Island.....	5	32,165,675	9,955,144	9,832,162	122,982	52,004,623	3.23	5.3
Tennessee.....	2	4,012,810	3,765,321	3,765,321	.....	16,898,823	1.07	4.5
Texas.....	4	7,744,794	4,257,582	4,204,344	53,238	13,856,859	1.82	3.3
Utah.....	1	556,625	292,100	292,000	100	861,910	1.91	3.0
Vermont.....	2	1,282,170	145,591	132,393	13,198	472,667	8.67	3.6
Virginia.....	5	4,351,318	1,830,490	1,822,752	7,738	5,000,368	2.38	2.7
West Virginia.....	3	2,287,015	3,167,015	3,167,015	.....	12,501,879	0.72	3.9
Wisconsin.....	5	3,181,790	2,407,322	2,407,322	.....	5,477,402	1.32	2.3

In the computations as to the consumption per car mile no allowance has been made for car lighting and car heating. Of 62,369 lighted cars, 55,703 were lighted by electricity. In the aggregate the consumption of power for this purpose would be very considerable; but it is obvious that no exact figures can be obtained, as the lighting varies materially with the season of the year, the state of the weather, the number of cars on the road, etc. This is also true of electric heating. Out of 30,159 cars heated, 19,021 had electric heaters. It was pointed out in the discussion of car heating that in winter weather to maintain a temperature of 54° in an ordinary car 3,160 watts would be required, and that this might be kept up for several hours. The power consumption for car heating undoubtedly is large. To the extent, therefore, that current is employed in car heating and car lighting, the current charged against car propulsion would be lessened. As a matter of fact, car lighting and car heating are as much a part of car operation as the act of propelling it along the track. But it would be obviously unfair to take the power consumption per car mile or per car hour in a city where little lighting and heating of cars was necessary and compare it with the consumption required in a city with long winters and short days.

Car hours.—In Table 97 statistics of car mileage are given for all roads. In addition, 390 companies report the number of car hours of operation. The car hour is a relatively new unit, having been adopted as a standard unit of comparison in 1901, after being under discussion for some time by the American Street Railway Accountants' Association. It makes but little difference what unit is used as a basis of comparison so long as the purpose is simply to show whether the earnings or the expenses are proportionately above or below those of a similar period on the same system; but to make a comparison with another system which has a different speed schedule, length of day operation, size of cars, and different physical conditions of operation, it is essential that the unit should be a comparable one, and the principal fact which companies wish to compare is cost of operation. The car-mile unit is to a certain extent a measure of speed, but increase of speed would not materially affect the cost of operation.

Another disturbing element in the use of the car mile as the unit is the trailer. When trailer cars are used regularly and to any considerable extent their car mileage is estimated separately. But, as has been pointed out, it is cheaper to operate one 40-foot motor car than a 20-foot motor car and a 20-foot trailer



THE ROTARY CONVERTERS IN A MANHATTAN ELEVATED RAILWAY SUBSTATION.



THE STEP-DOWN TRANSFORMERS IN A MANHATTAN ELEVATED RAILWAY SUBSTATION.

hitched together. If two roads are compared, the one using 40-foot motor cars and the other a motor and a trailer of the same combined length, and if they be operated at the same speed, headway, etc., the first would show a cost, say, of 12 cents per car mile. The other one, on account of the double mileage indicated, would show, allowing for the fact that but one conductor would be needed, a little more than one-half of 12 cents per car mile for the two cars. Again the car mile does not take into account questions of grades. A car going uphill takes a great deal of power, while a car going downhill should take none, and might even become a source of current return to the line. As all grades and loads affect speed, mileage could not be a fixed standard without some sort of adjustment.

In the earlier stages of the introduction of the car-hour unit it was contended that the cost of ascertaining the number of motor car hours would be such as to hinder its adoption or use on a large system. According to street railway accountants, car hours are more easily determined than car mileage, and that the cost of ascertaining the facts is less, especially in cities where a large number of cars are run without reference to schedule time, but are operated wherever and whenever deemed necessary. Experience has shown that the reports of mileage made by trainmen are only approximately correct, but it is evident that the record of the time of starting a car and returning it to the barn can be accurately kept and verified. This seems to be the best and most accurate unit yet suggested. The arguments in favor of the car hour, as compared with the car mile, summed up briefly are as follows:

- (1) The absence of the element of speed, which from the standpoint of cost is destructive of correct comparison on the car-mile basis.
- (2) Conductors' and motormen's wages, the principal item of expense, are paid by the car hour and not by the car mile.
- (3) Operating expenses are more directly affected by the length of time of operation than by the mileage made.

Perhaps the value of the car-mile and car-hour records can best be illustrated from a concrete example, such as that afforded by the Camden and Suburban Railway Company, of Camden, N. J. For the past four or five years that company has used the car-hour unit in connection with the car mile, and all its statistics are worked out on both bases. It will be noted, for example, that in Table 97 the company reported 319,066 car hours, a total of 2,501,430 car miles, carrying a total of 8,217,072 passengers. The output of power reported by the system was 3,734,315 kilowatt hours. The company has found the car-hour unit of value because it is the only basis upon which the labor factor can be calculated. On the other hand, the car-mile unit is after all the only practicable one for closely figuring out wear of parts and depreciation of rolling

stock. An illustration of the value of using both units is furnished by the company in a comparison between one of the city lines and one of the suburban lines. The city line had receipts for the year 1902-3 of 21.46 cents per car mile, and \$1.24 per car hour. The suburban line had receipts of 14.69 cents per car mile and \$1.90 per car hour. In other words, the suburban line had receipts which were 32 per cent less per car mile, and 53 per cent more per car hour than the city line. If, therefore, the car-mile basis alone had been taken, the suburban line would probably be viewed as unprofitable compared with the usual standard of receipts per car mile, whereas the car-hour basis was sufficient to show that the line was operated at a good margin of profit.

The value of the car-hour unit may be again illustrated from the Camden and Suburban system, whose Moorestown line formerly terminated at Merchantville. When the line was extended 5 miles farther, to Moorestown, the question arose as to whether this extension would pay. An additional fare of 5 cents was charged over the extension. The added service required an addition of 1,360 car hours a month. An investigation showed that 80 per cent of the traffic to and from Moorestown was through traffic, and that the 5,000 population was carried on an average 120 times per capita per year. This made the additional receipts per month about \$5,000. Taking this sum and dividing it by the 1,360 extra car hours per month, the receipts for the extension were shown to be \$3.60 per car hour, a proof to the company and to the community of the value of the extension.

The unit has proven of further value in analyzing expenses, for example, in the separation of labor cost and the isolation of what may be called the "lay-over" expenses. For example, a short or a long lay-over would not affect the wear and tear of a car, or the power cost or consumption of kilowatt hours, but it would enter into the labor cost indirectly, which, upon lines operating at different speeds, can best be figured on the car-hour basis.

Tables 53 and 54, which present analyses of operating expenses of railways classified according to population of urban centers served, give statistics that must be considered in connection with the subject of power. The cost of operation of power plants in cities of over 500,000 population amounted to \$9,641,891, or 14.3 per cent of the total operating expenses. In cities between 100,000 and 500,000 population the ratio was almost exactly the same, or 14.2 per cent; in cities from 100,000 down to 25,000 population, it was 16.2 per cent; in cities under 25,000 population, 24.5 per cent. In the separate groups of interurban lines, the ratio of power plant cost to total operating expenses was 22 per cent on the fast long lines, and 20.2 on the other.

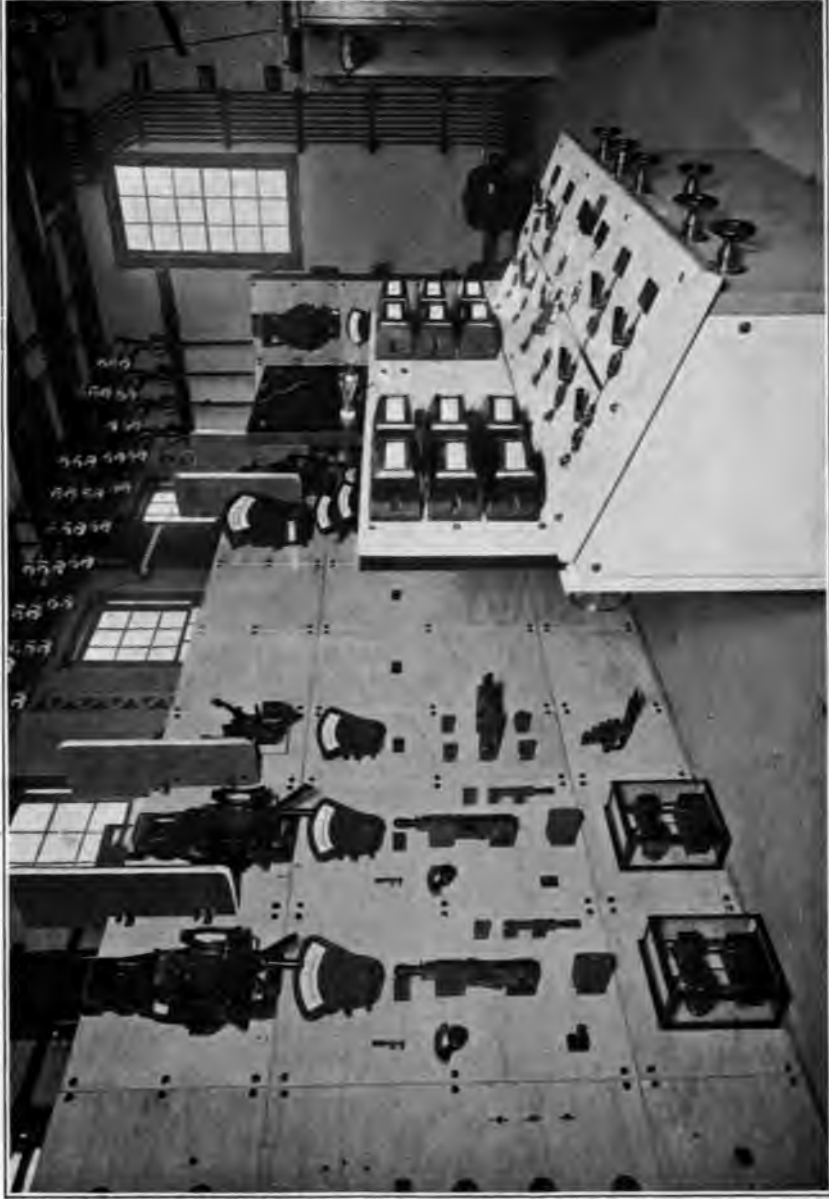
Thermal efficiency.—Upon the general subject of power station economies in the matter of output and

cost per kilowatt hour unit, many facts and opinions might be offered which would aid in interpreting the statistics of the subject as given in this volume. It will perhaps be sufficient to give here the substance of a paper on power station economy presented before the American Institute of Electrical Engineers, by Prof. W. E. Goldsborough and Mr. P. E. Fansler, which embodied the results of careful tests made during the year 1902 in regard to the expense incurred in maintaining the power stations of the Union Traction Company of Indiana. The plant then comprised eight 400-horsepower water tube boilers; three engines, each with a maximum capacity of 2,000 horsepower; and three 1,000-kilowatt 3-phase generators directly connected with each engine. The results of the tests of the thermal efficiency of the plant are as follows: The efficiency of the furnace and boiler was 79.6 per cent—i. e., 79.6 per cent of the whole heat in the coal was delivered in the steam by the boilers to the engines. The average thermal efficiency of conversion between the boilers and engine cylinders is 9.11 per cent; i. e., 9.11 per cent of all the heat delivered in the form of steam by the boilers was converted into work in the cylinders of the main engines. This value of 9.11 per cent credited against the engines includes the steam used in the auxiliaries. If the assumption is followed out that 15 per cent of the steam delivered by the boilers was consumed by the auxiliaries, the thermal efficiency of the engines would be 10.7 per cent. The average total thermal efficiency of the plant was 7.25 per cent from the coal pile to the engine cylinders, and the total average thermal efficiency of the plant from the coal pile to the switchboard; i. e., the ratio per cent of the energy delivered by the generators to the total heat in the coal was 6.39 per cent.

Although it is frequently stated that the thermal efficiency of the steam engine at a maximum is about 25 per cent, it is impossible that any engine of this class working under these conditions should convert more than 12 per cent of the heat of the coal into work. This record of a thermal efficiency of 6.39 per cent up to and including the switchboard showed high economy as compared with those shown by some other stations of a similar character. Thus the total thermal efficiency of the Harrison Street station of the Chicago Edison Company, with large direct connected reciprocating engines has been estimated to be 4.5 per cent, while that of the generating station of the former Blue Island (Chicago) Storage Battery Road was found to be 5.5 per cent. Indiana block coal was used, delivered at a cost of \$1.35 per ton. On this basis the cost of developing one kilowatt hour was .28 of a cent. This kilowatt-hour unit of cost may be taken as the fundamental basis for estimating the efficiency of any station; figures of this cost in various stations vary between 0.246 and 1.016 cents. Professor Goldsborough, in the report to which reference has been made, said that the station

tested by him delivered to the line 6.23 per cent of the total energy of the coal, but that only 3.65 per cent of the total energy got to the cars. The efficiency of transmission as between the station and the cars was, therefore, only 50 per cent. In the discussion following the report, Mr. M. H. Gerry said that if every loss between the electrical input at the cars, and the car axle were included, the total efficiency of the plant would certainly be reduced 25 to 30 per cent more—to about 2 per cent. Professor Goldsborough admitted that this was a fair estimate, but he pointed out that power was developed so cheaply that this final waste became a small factor, one passenger per car nearly paying the whole cost of power used by a car from Indianapolis to Muncie, although the fare was only 1 cent a mile. Mr. Gerry contended that the plant was not an example of high efficiency or even of average efficiency. Professor Goldsborough replied that the plant had a very high financial efficiency, which he considered to be better than a high power efficiency. To reduce the transmission losses would be to increase the capital charge, and such an increase might more than balance the present high cost for coal. If a low-class generating station, low-class transformers, low-class rotaries, and cheap batteries were put in, the cars would not get the required per cent of power of the total energy generated. The station had the highest class of generating machinery, and should it become necessary to increase its earning capacity all that would have to be done would be to increase the copper in the lines. The regular voltage was 18,000, but in extending its system to Logansport the company had used 32,000 volts. Mr. H. G. Stott, of the Manhattan Elevated system, said that the ultimate object in any power plant was to deliver a kilowatt hour to the receiving apparatus at a minimum cost, and that there is no other object in a power plant. If the coal is expensive, an extremely efficient and expensive plant must be put in; but if coal is very cheap, one can afford to sacrifice a good deal of thermal efficiency in order to reduce the cost charges of the plant. In the end, however, one must consider the problem as a whole; that is, the cost of the kilowatt hour delivered at the receiving apparatus. The total cost of the delivery of power is the real test. In the New York Manhattan plant he said the cost of coal was 70 per cent of the total operating expenses up to the track of the elevated road, and consequently an extremely efficient distributing system and power plant were required. He thought that any comparison of efficiencies was unfair when calculated merely on the ratio of indicated horsepower to kilowatt-hour output.

With regard to the efficiency of transmission and its relation to the consumption of current, it may be repeated that this varies greatly and depends upon a number of factors, especially those connected with the length and condition of the line, the pressure employed, the number of substations, the amount of transformation,



SWITCHBOARD IN A MANHATTAN ELEVATED RAILWAY SUBSTATION.

etc. These questions are more complicated, and perhaps more interesting in the case of the longer interurban roads, and the results of some recent tests on the efficiency of transmission on one of the large interurban railway systems in the Middle West are therefore given here pertinently. The system referred to comprised about 100 miles of track built for the most part over private right of way, and was supplied with current from a single power plant at a line pressure of 26,000 volts. As the maximum distance from the station to the farthest point at which current was delivered was 60 miles, it is clear that the station was not exactly midway of the track. Current was generated by 3-phase alternating dynamos. The output measured at the generator terminals at 2,300 volts for the period of six weeks covered by the test was 970,000 kilowatt hours. This current was raised to the pressure of 26,000 volts

made by step-up transformers, received by step-down transformers at five substations, and delivered to the line for the motors as direct current at a pressure of 500 to 550 volts. The output of the rotaries to the operation line during this period was 803,000 kilowatt hours, showing a loss in the transmission system of about 17 per cent. This included the loss in the step-up transformers, the transmission circuits, the substations step-down transformers, and the rotary converters. The loss in the apparatus was estimated at about 121,000 kilowatt hours, or 11.9 per cent, and the loss in the transmission line was put down at 46,000 kilowatt hours, or 5.1 per cent. The load on the power plant and the line was steadied by means of a storage battery and a carefully adjusted "booster" at the farthest substation. These figures may be taken to represent a high transmission efficiency.

STREET RAILWAYS OPERATING ELECTRIC LIGHT AND POWER PLANTS.

As already explained, a number of street railway companies generate electricity for sale to other roads or for light, power, or other purposes. If, in such cases, the system of accounts used by the company permitted the preparation of separate and complete reports for the street railway plant and the electric light and power plant, respectively, separate reports were obtained. If the system of accounts did not permit

of such separation, one report was secured for the entire plant. Where possible, the companies were required to give separately the amount of revenue derived from the sale of electric current for light or power, and the character of such service.

Tables 90 and 91 present these statistics for the 118 companies reporting.

TABLE 90.—INCOME—ELECTRIC LIGHT AND POWER PLANTS OPERATED BY STREET RAILWAY COMPANIES, BY STATES: 1902.

STATE.	Number of companies.	Aggregate.	COMMERCIAL OR PRIVATE LIGHTING.		PUBLIC LIGHTING.		MOTOR SERVICE.	Electric railway service.	Electric heating.	Charging automobiles.	All other electric service.	Miscellaneous.		
			Total.	Arc.	Incandescent.	Total.	Arc.						Incandescent.	Amount.
				Amount.	Amount.		Amount.						Amount.	
United States....	118	\$6,469,726	\$4,074,684	\$660,279	\$3,414,405	\$1,417,985	\$1,267,384	\$150,601	\$768,040	\$6,630	\$77	\$9	\$4,390	\$197,911
Alabama	4	318,660	257,454	35,055	222,399	32,712	30,106	2,606	26,345				500	1,649
Florida	3	110,209	84,657	9,441	75,216	11,900	9,660	2,240	13,652					
Georgia	7	722,728	421,024	112,940	308,084	173,183	153,508	19,680	119,260				233	9,028
Illinois	4	161,070	118,620	21,929	96,691	6,458	6,458		23,038	395			3,356	9,203
Iowa	8	291,142	154,945	23,586	131,359	75,435	71,515	3,920	40,043					20,719
Maine	3	101,892	67,739	7,978	59,761	11,856	10,904	952	15,141					7,156
Michigan	6	162,549	106,490	9,595	96,895	42,090	36,987	5,103	9,340					4,629
Mississippi	3	98,838	46,232	7,670	38,562	43,547	37,441	6,106	8,982		77			
Missouri	3	163,406	138,514	3,533	134,981	10,250	9,920	330	2,240					12,402
New York	10	413,782	243,233	19,969	223,264	140,998	97,988	43,010	28,172					1,379
North Carolina	5	156,770	86,919	6,104	80,815	32,486	30,999	1,497	36,365					
Ohio	11	587,967	374,322	45,229	329,093	147,225	143,725	3,500	53,382					13,038
South Carolina	3	171,561	99,128	7,942	91,186	33,993	33,201	792	22,127					16,313
Virginia	7	359,158	261,246	75,248	185,998	65,954	62,441	3,513	28,400					3,558
Washington	4	618,385	439,358	95,182	344,176	44,544	22,948	21,596	76,635	1,795				56,053
West Virginia	3	105,102	67,181	2,975	64,206	36,253	36,253		1,668					
Wisconsin	9	689,572	368,540	90,394	278,146	217,277	215,334	1,943	77,166					26,549
All other states ¹	25	1,237,935	739,082	85,509	653,573	291,824	256,011	33,813	186,084	4,440		9	301	16,196

¹ Includes states having less than 3 companies in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arkansas, 2; California, 2; Colorado, 2; Connecticut, 2; Delaware, 1; Indiana, 2; Kansas, 1; Kentucky, 2; Louisiana, 1; Maryland, 1; Minnesota, 1; Montana, 1; Nebraska, 1; New Hampshire, 1; New Jersey, 2; Oregon, 1; Tennessee, 2.

STREET AND ELECTRIC RAILWAYS.

TABLE 91.—DETAILED DESCRIPTION OF SERVICE—ELECTRIC LIGHT AND POWER PLANTS OPERATED BY STREET RAILWAY COMPANIES, BY STATES: 1902.

STATE.	ARC LIGHTING—NUMBER OF LAMPS IN SERVICE.															
	Aggregate.	Total.				Direct current.				Alternating current.				All other.		
		Commercial or private.		Public.		Commercial or private.		Public.		Commercial or private.		Public.		Commercial or private.	Public.	
		Open.	In-closed.	Open.	In-closed.	Open.	In-closed.	Open.	In-closed.	Open.	In-closed.	Open.	In-closed.	Open.	In-closed.	Open.
		United States	33,863	2,582	13,603	10,868	6,810	2,413	6,459	10,495	1,072	1	7,069	8	5,738	168	75	365
Alabama	1,291	449	442	325	75	449	388	325			54		75			
Florida	222	103	55		64	103					55		64			
Georgia	4,847	238	2,092	761	1,256	238	1,294	761	238		798		1,018			
Illinois	817	235	328		254	235	295		254		83					
Iowa	1,603	133	388	812	270	133	84	812	40		304		230			
Maine	431	25	280	115	61	25	115	115	30		115		81			
Michigan	869	30	286	352	201	30	36	352			250		201			
Mississippi	477		112	132	233			132			112		233			
Missouri	203	37	5	111	50	37		111			5		50			
New York	2,594	56	1,070	964	504	56	65	964		1	1,005		504			
North Carolina	613	12	174	325	102	12		325			174		102			
Ohio	2,933	24	518	1,888	553	24	90	1,838			353		553		75	
South Carolina	693		236		457		37		198		199		259			
Virginia	2,983	219	1,710	757	297	219	933	757	100		777		197			
Washington	1,854	116	1,416	19	303	116	1,263	19	121		153		182			
West Virginia	572		70	75	427			75			70		427			
Wisconsin	4,715	387	1,778	1,871	679	387	1,277	1,871	91		501		588			
All other states ¹	6,646	518	2,693	2,411	1,024	350	582	2,038			2,111	8	1,024	168		365

STATE.	INCANDESCENT LIGHTING—NUMBER OF LAMPS IN SERVICE.								STATIONARY MOTOR SERVICE.		Number of mechanical meters on consumption circuits.	
	Aggregate.	Total.		16-candlepower.		32-candlepower.		All other.		Number of motors of all kinds.		Total capacity in horse-power.
		Commercial or private.	Public.	Commercial or private.	Public.	Commercial or private.	Public.	Commercial or private.	Public.			
United States	1,442,685	1,423,659	19,026	1,313,303	13,065	31,597	1,119	78,759	4,842	10,049	35,688	56,601
Alabama	50,704	50,045	659	47,705	659	2,203		137		648	936	2,606
Florida	19,872	19,541	331	19,408	323	127	8	6		137	714	880
Georgia	136,978	135,604	1,374	132,630	900	1,470	30	1,504	444	2,066	4,844	5,121
Illinois	42,426	42,426		37,883		226		4,317		202	611	1,475
Iowa	62,284	61,924	360	57,610	60	1,880	50	2,484	250	549	1,479	3,338
Maine	39,443	39,379	64	38,079		300	39	1,000	25	129	1,011	1,139
Michigan	43,389	41,169	2,220	36,577	2,130	1,134	90	3,458		136	700	1,857
Mississippi	12,887	11,890	997	11,290	997	100		500		295	198	714
Missouri	66,180	66,075	55	45,000	50	75	5	21,000		87	119	1,553
New York	100,561	98,812	1,749	86,960	691	2,257	47	9,605	1,011	336	2,662	5,217
North Carolina	31,742	31,498	244	28,132	204	423	40	2,943		105	1,544	1,273
Ohio	189,708	188,065	1,643	186,683	1,613	682	20	700	10	513	3,589	5,813
South Carolina	24,225	24,117	108	23,517	100	600			8	689	618	1,270
Virginia	65,148	64,815	333	52,595	323	2,224	5	9,996		1,960	1,467	3,100
Washington	93,247	90,483	2,764	70,667	205	10,828	35	8,988	2,524	587	3,720	4,888
West Virginia	23,294	23,294		20,964		1,647		663		28	121	770
Wisconsin	180,073	179,611	462	170,305	337	3,646	125	5,660		87	3,711	5,403
All other states ¹	280,574	264,911	5,663	247,288	4,468	1,825	625	5,798	570	1,495	7,644	9,234

¹ Includes states having less than 3 companies in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arkansas, 2; California, 2; Colorado, 2; Connecticut, 2; Delaware, 1; Indiana, 2; Kansas, 1; Kentucky, 2; Louisiana, 1; Maryland, 1; Minnesota, 1; Montana, 1; Nebraska, 1; New Hampshire, 1; New Jersey, 2; Oregon, 1; Tennessee, 2.

² Includes 82 chemical.

GENERAL TABLES

STREET AND ELECTRIC RAILWAYS.

TABLE 92.—AVERAGE NUMBER OF EMPLOYEES AND TOTAL SALARIES

[This table does not include reports for 20 companies]

1	STATE.	Number of companies.	SALARIED OFFICIALS AND CLERKS.							
			Total.		General officers.		Other officers, managers, superintendents, etc.		Clerks.	
			Average number.	Salaries.	Average number.	Salaries.	Average number.	Salaries.	Average number.	Salaries.
1	United States	797	7,128	\$7,439,716	1,480	\$2,990,745	1,327	\$1,819,166	4,321	\$2,629,805
2	Alabama	9	57	65,245	12	24,701	12	21,940	83	18,604
3	Arkansas	7	23	18,250	8	9,099	6	3,642	9	5,509
4	California	34	255	309,822	48	103,628	61	99,811	146	106,383
5	Colorado	7	74	87,737	18	38,813	12	18,466	44	30,468
6	Connecticut	21	185	221,561	56	127,904	28	33,345	101	60,312
7	Delaware	3	15	11,581	9	6,400	2	2,460	4	2,721
8	Florida	6	37	39,981	12	18,398	8	9,831	17	11,752
9	Georgia	10	72	101,911	20	46,222	18	35,070	34	20,619
10	Illinois	48	535	669,518	97	237,995	88	152,173	350	279,350
11	Indiana	26	176	181,167	52	93,060	30	35,000	94	53,107
12	Iowa	22	87	88,229	29	47,738	13	14,623	45	25,868
13	Kansas	11	30	25,184	17	16,500	5	4,730	8	3,864
14	Kentucky	12	59	73,259	25	44,832	11	11,099	23	17,328
15	Louisiana	8	62	86,723	20	53,567	6	8,649	36	24,507
16	Maine	19	65	57,218	20	22,998	11	14,064	34	20,156
17	Maryland	10	156	126,742	14	40,909	10	13,499	132	72,334
18	Massachusetts	74	896	912,549	131	266,635	236	273,777	529	372,137
19	Michigan	24	256	262,802	53	125,835	49	58,094	154	78,873
20	Minnesota	5	88	110,755	9	43,234	15	29,995	64	37,526
21	Mississippi	5	21	17,699	11	12,959	1	300	9	4,440
22	Missouri	16	272	340,013	33	136,140	86	103,116	153	100,757
23	Montana	5	14	20,825	5	11,150	1	1,600	8	8,075
24	Nebraska	4	22	26,610	10	17,007	1	1,875	11	7,728
25	New Hampshire	7	25	20,588	8	9,088	5	5,924	12	5,576
26	New Jersey	25	276	251,795	53	107,086	50	57,763	173	86,986
27	New York	96	1,221	1,127,405	188	428,451	136	203,610	897	495,811
28	North Carolina	7	42	28,767	15	14,275	5	6,625	22	7,867
29	Ohio	62	563	541,576	131	269,697	91	118,452	341	153,427
30	Oregon	6	35	44,207	10	20,733	8	10,965	17	12,509
31	Pennsylvania	97	771	799,725	152	222,921	183	297,497	436	279,307
32	Rhode Island	7	37	44,456	10	25,777	4	3,324	23	15,355
33	South Carolina	7	40	31,212	13	17,260	12	9,386	15	4,566
34	Tennessee	8	49	64,872	16	32,075	11	18,054	22	14,743
35	Texas	17	66	92,603	25	56,623	13	16,154	28	19,826
36	Utah	3	11	15,600	4	9,900	3	3,260	4	2,440
37	Vermont	9	25	13,733	13	6,046	6	5,720	6	1,967
38	Virginia	16	106	78,388	47	42,152	18	17,706	41	18,525
39	Washington	8	89	109,143	24	50,775	9	19,580	56	38,788
40	West Virginia	8	46	46,277	13	26,284	10	6,820	23	13,173
41	Wisconsin	17	173	146,346	30	53,591	28	32,443	115	60,312
42	All other states ¹	11	96	127,647	19	52,247	25	38,734	52	36,666
43	Hawaii and Porto Rico	5	22	25,179	9	8,969	2	5,800	11	10,420

¹ Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

GENERAL TABLES.

233

AND WAGES, OPERATING COMPANIES, BY STATES: 1902.

which failed to furnish this information.]

WAGE-EARNERS.													
Total.		Foremen.		Inspectors.		Conductors.		Motormen.		Starters.		Watchmen.	
Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.
133,641	\$80,770,449	1,782	\$1,518,400	1,095	\$852,629	40,141	\$24,025,204	40,008	\$24,617,155	960	\$721,031	921	\$497,103
921	481,045	18	16,044	20	15,215	208	105,877	217	112,639	3	1,707	6	2,190
225	112,665	2	1,621			55	21,905	85	44,175	3	1,707	1	480
5,187	3,588,889	118	114,934	26	25,975	1,769	1,141,482	1,776	1,147,317	24	22,720	25	16,673
979	734,519	12	12,870	8	7,479	296	224,862	302	231,261			2	1,104
2,536	1,462,800	48	38,262	15	10,654	780	442,579	778	442,425	15	12,069	26	15,146
236	166,104	4	2,820	1	913	82	60,080	82	60,080	3	2,801	1	639
374	162,781	9	6,206	6	4,097	100	39,399	99	37,851	3	1,426	6	3,421
1,971	755,355	15	9,871	20	12,923	493	158,480	512	170,243	6	6,296	4	1,396
11,057	7,267,270	120	106,138	37	28,520	3,588	2,444,620	2,788	2,094,870	41	33,273	41	21,919
2,448	1,289,718	70	47,150	12	10,271	637	332,116	674	364,174	4	2,660	16	5,970
1,516	799,671	30	25,578	17	10,700	377	177,629	443	230,912	5	3,720	8	3,699
275	143,623	5	3,648	3	1,942	57	27,020	102	53,381			5	2,452
1,331	678,670	25	18,138	29	20,249	286	99,084	557	288,499	14	10,220	14	10,285
1,646	1,081,875	22	22,138	18	14,310	525	346,139	538	351,266	8	6,180	18	10,934
969	526,062	4	3,562			258	141,941	259	142,135	8	3,660	13	7,536
2,883	1,418,219	31	21,601			1,005	443,261	933	446,404	32	20,160	29	12,549
13,998	8,980,513	195	186,796	114	90,266	4,084	2,660,947	4,001	2,711,885	192	140,436	130	72,231
3,192	2,008,174	58	45,791	51	34,229	895	592,063	951	631,592	50	35,577	30	14,745
1,509	979,044	42	35,218	7	5,400	475	299,127	482	294,234	8	5,220	3	1,643
137	72,178	3	1,865	2	1,105	28	15,229	32	17,351	1	480	1	639
5,186	3,432,170	56	43,365	13	9,980	1,767	1,109,345	1,740	1,100,274	26	18,375	23	12,901
178	172,643	5	6,235			60	57,842	55	51,886			1	1,148
527	350,966	9	7,562	2	1,560	172	119,273	187	119,696	1	780	5	2,664
357	203,823	4	3,506	2	1,601	123	67,679	123	67,630	5	2,061	10	5,822
3,880	2,370,078	71	63,230	85	68,270	1,237	745,342	1,218	753,769	90	69,710	40	21,240
33,192	19,800,755	205	179,159	316	261,588	9,661	5,528,938	9,204	5,796,023	262	208,182	173	98,872
376	129,286	10	7,292	2	1,200	94	29,088	95	29,762	3	1,620	5	2,053
9,451	5,475,397	155	124,191	117	80,507	2,910	1,663,807	3,019	1,761,552	50	35,425	42	22,547
490	394,056	12	14,480	1	900	152	126,473	155	126,626			8	5,465
15,721	9,286,237	168	146,974	94	75,386	5,059	3,066,195	5,479	3,074,740	57	41,984	146	73,527
1,609	1,099,423	29	27,005	15	12,770	424	304,091	419	300,305	6	5,017	20	12,462
372	147,979	16	12,395	4	2,920	113	37,931	113	38,277	1	455	5	2,100
1,205	533,878	24	19,986	20	12,833	385	164,145	399	176,851	4	2,400	12	4,200
929	503,475	22	18,436	3	2,700	231	129,006	349	182,270	4	2,712	7	3,872
285	197,032	3	3,120	2	1,200	90	65,506	108	75,059	2	1,920	2	1,170
165	97,823	7	4,920	1	641	55	33,683	56	34,109			4	2,107
960	423,319	30	17,548	5	3,185	259	114,522	247	114,326	2	1,389	8	3,060
1,250	896,737	44	45,303	14	14,760	349	222,103	353	222,087			4	2,580
621	352,003	13	9,690	2	1,200	195	110,890	204	118,573	4	2,530	4	1,990
2,042	1,300,421	61	39,318	6	2,940	406	269,268	477	310,462	4	2,520	12	6,023
1,455	896,781	7	5,236	3	2,700	451	286,237	447	290,185	20	15,404	11	5,649
381	177,820	7	5,540	1	1,500	78	35,238	116	58,257			5	1,210

STREET AND ELECTRIC RAILWAYS.

TABLE 92.—AVERAGE NUMBER OF EMPLOYEES AND TOTAL SALARIES

STATE.	WAGE-EARNERS—continued.							
	Switchmen.		Road and track men.		Hostlers, stablemen, etc.		Linemen.	
	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.
1 United States.....	1,198	\$728,975	11,474	\$5,511,425	1,845	\$813,425	2,288	\$1,553,478
2 Alabama			63	22,728	15	7,840	21	14,217
3 Arkansas			19	8,548	6	2,310	4	2,541
4 California	39	83,278	399	261,250	77	50,442	53	45,008
5 Colorado	4	2,400	130	72,128	2	1,620	40	35,143
6 Connecticut.....	13	6,079	325	145,569	10	5,810	98	61,342
7 Delaware.....	2	1,278	17	5,575			5	3,325
8 Florida			34	8,801	1	468	16	11,174
9 Georgia.....	1	606	394	100,512	3	1,054	82	42,475
10 Illinois.....	96	62,457	608	346,383	107	59,912	97	71,274
11 Indiana.....	2	546	326	134,931	47	25,346	69	41,070
12 Iowa.....			201	91,124	15	7,874	59	38,300
13 Kansas.....			46	19,434	2	575	4	2,340
14 Kentucky.....	6	3,285	165	78,309	11	6,022	26	18,392
15 Louisiana.....	10	2,759	86	42,810	12	7,020	23	19,303
16 Maine.....			158	66,704	36	19,069	25	14,533
17 Maryland.....	1	450	254	96,749	11	5,940	47	24,919
18 Massachusetts.....	162	96,158	899	462,163	105	69,724	239	168,390
19 Michigan.....	10	4,415	344	167,454	9	4,404	58	37,981
20 Minnesota.....	12	5,760	63	40,340	8	4,560	17	11,514
21 Mississippi.....			19	5,708			6	4,432
22 Missouri.....	10	4,600	301	159,606	32	18,629	42	32,242
23 Montana.....			19	17,296	4	3,452	7	3,619
24 Nebraska.....			21	9,048	1	600	4	2,844
25 New Hampshire.....			35	18,099	3	1,695	9	5,649
26 New Jersey.....	45	13,890	243	108,360	38	27,084	68	44,015
27 New York.....	591	393,921	2,778	1,411,386	546	356,287	430	320,269
28 North Carolina.....	2	363	60	14,799	2	290	25	8,929
29 Ohio.....	44	19,051	928	407,765	43	21,207	193	132,583
30 Oregon.....			52	34,156	1	600	11	8,443
31 Pennsylvania.....	81	39,646	1,521	677,117	142	77,558	241	145,061
32 Rhode Island.....	16	8,830	211	118,439	3	1,615	26	20,078
33 South Carolina.....	1	300	35	9,386	2	468	12	5,836
34 Tennessee.....	1	365	141	47,232	8	3,291	22	12,214
35 Texas.....			131	55,077	8	3,516	22	13,832
36 Utah.....			47	26,338	1	630	3	3,000
37 Vermont.....			19	8,874	3	1,652	3	1,688
38 Virginia.....	9	2,206	71	21,355	3	1,213	34	16,641
39 Washington.....			121	86,362	5	3,780	68	58,885
40 West Virginia.....			62	27,722	4	1,800	14	9,094
41 Wisconsin.....	1	365	77	39,465	7	3,263	48	29,515
42 All other states.....	39	18,972	76	36,875	12	4,865	17	11,368
43 Hawaii and Porto Rico.....	1	250	44	17,219	47	14,111	7	2,608

GENERAL TABLES.

235

AND WAGES, OPERATING COMPANIES, BY STATES: 1902—Continued.

WAGE-EARNERS—continued.													
Engineers.		Dynamo and switch-board men.		Electricians.		Firemen.		Mechanics.		Lamp trimmers.		Other employees.	
Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.	Average number.	Wages.
1,751	\$1,527,798	1,167	\$761,304	1,150	\$901,524	2,694	\$1,735,647	9,197	\$6,312,119	338	\$197,254	16,137	\$8,495,963
12	10,960	9	4,790	1	900	16	8,210	56	39,886	10	4,556	249	114,996
12	6,930	2	1,682			16	6,233	14	12,069	1	500	5	1,964
56	64,573	48	38,433	54	47,885	101	74,833	437	354,352	17	14,382	166	135,852
21	24,024	10	9,988	6	6,439	37	30,737	37	28,601	4	3,120	68	42,743
57	51,621	15	10,400	18	13,144	54	38,038	163	105,406	15	9,210	106	55,046
8	7,740			1	912	10	6,861	10	8,005			10	5,075
11	9,857	5	3,098	1	551	10	5,278	17	7,912	3	1,557	53	22,185
23	20,785	24	10,659	9	6,906	30	13,156	33	19,535	28	15,409	302	165,047
104	92,442	183	109,655	67	47,711	191	124,463	732	498,597	14	7,405	2,348	1,118,681
54	36,362	27	18,987	9	7,680	52	27,631	219	122,296	6	3,391	224	109,167
44	32,957	5	2,820	21	15,330	67	36,182	121	78,901	13	6,456	90	37,489
12	9,400	1	720	4	3,780	10	5,852	10	6,680	1	600	13	8,799
20	16,041	2	1,120	13	7,752	32	17,039	98	67,544	7	4,290	26	12,401
23	26,340	31	21,016	4	3,240	25	16,780	97	79,533	1	420	205	111,687
32	23,862	3	1,200	46	33,828	29	15,900	39	19,993	1	550	58	31,889
28	23,806	12	8,640	10	6,840	40	26,531	252	169,248			198	111,321
196	181,589	65	49,493	80	54,317	242	153,939	1,532	1,020,518			1,772	859,667
59	52,190	69	43,270	23	18,624	67	41,636	273	165,002	7	4,027	238	110,174
15	13,145	14	10,884	17	10,812	24	10,258	98	67,565	5	3,660	219	159,674
7	6,190	2	913	2	2,100	10	5,633	5	3,148	4	1,982	15	5,453
59	51,119	24	16,912	19	14,715	112	73,824	271	224,502	4	2,280	687	539,501
3	4,927	3	2,708	1	854	4	4,407	8	9,932	2	900	6	7,437
4	3,225	1	900	3	2,920	17	11,190	52	34,220			48	34,477
10	9,085			4	3,169	6	3,735	19	12,447	1	730	3	976
37	31,294	41	27,924	25	21,477	67	36,367	423	245,448	13	10,900	134	76,808
209	192,207	302	182,213	320	291,084	578	426,410	1,680	1,263,288	45	30,036	5,912	2,880,942
19	14,050	2	840	3	1,800	19	6,266	8	2,791	7	2,640	20	5,511
168	146,168	110	73,611	79	55,225	231	141,326	664	441,032	48	26,369	650	323,031
9	9,364	2	1,440	2	2,280	16	11,420	43	36,874	2	1,186	24	14,349
244	188,610	49	36,701	213	144,622	351	218,184	1,228	775,301	1	493	647	504,238
16	16,271	2	1,824	15	11,077	27	18,410	87	55,285			293	185,944
7	6,660	7	4,112	3	3,250	8	4,214	10	5,690	4	2,378	31	11,607
15	13,573	3	1,095			19	6,988	67	33,227	6	3,275	79	32,703
16	14,270	1	600	8	5,903	18	10,609	51	34,892			58	25,690
2	1,620					2	1,116	17	10,698			11	5,655
4	2,849			1	800	2	1,140	3	1,806			7	3,554
36	26,791	13	6,529	10	7,537	29	12,982	31	15,539	14	7,081	159	51,485
26	26,895	25	20,560	20	19,270	49	35,880	73	63,744	11	7,600	88	68,928
28	20,808	6	2,880	4	3,880	23	13,414	19	11,356	4	2,100	35	14,094
31	25,298	38	24,928	14	9,767	37	21,713	108	84,656	24	17,821	681	413,064
14	12,350	11	7,750	20	13,583	16	11,290	112	74,678			199	99,680
7	7,717			1	1,320	5	2,885	27	17,133	7	1,916	28	10,706

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
	UNITED STATES.....				122,576.99	123,134.44	\$1,529,199,589	\$1,315,572,960
	ALABAMA.							
	Total for state.....				204.72	204.72	7,736,900	7,696,900
1	Anniston, Oxford.....	Anniston Electric and Gas Co.....	Dec. 1, 1901	Nov. 30, 1902	10.00	10.00	136,000	136,000
2	Birmingham, Bessemer, Pratt City.....	Birmingham Railway, Light and Power Co.....	July 1, 1901	June 30, 1902	110.00	110.00	4,500,000	4,500,000
3	Decatur, New Decatur.....	Decatur Street Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	3.03	3.03	100,000	100,000
4	Gadsden, Alabama City, Attalla.....	Alabama City, Gadsden and Attalla Rwy. Co.....	Aug. 1, 1901	July 31, 1902	6.70	6.70	100,000	60,000
5	Huntsville, Dallas.....	Huntsville Railway, Light and Power Co.....	July 1, 1901	June 30, 1902	4.62	4.62	150,000	150,000
6	Mobile and vicinity.....	Mobile Light and R. R. Co.....	Sept. 1, 1901	Aug. 31, 1902	37.50	37.50	2,250,000	2,250,000
7	Montgomery.....	Montgomery Street Rwy. Co.....	Aug. 1, 1901	July 31, 1902	20.00	20.00	350,000	350,000
8	Selma.....	Selma Street and Suburban Rwy. Co.....	July 1, 1901	June 30, 1902	5.87	5.87	125,000	125,000
9	Tuscaloosa.....	Tuscaloosa Belt Rwy. Co.....	July 1, 1901	June 30, 1902	7.00	7.00	25,900	25,900
	ARIZONA.							
	Total for territory.....				17.10	17.10	150,000	127,800
1	Phoenix.....	Phoenix Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	12.00	12.00	100,000	100,000
2	Tucson.....	Tucson Street Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	5.10	5.10	50,000	27,800
	ARKANSAS.							
	Total for state.....				1051.33	1051.33	1,065,300	885,300
1	Eureka Springs.....	Citizens Electric Co.....	Apr. 1, 1902	Dec. 31, 1902	3.17	3.17	27,500	27,500
2	Fort Smith.....	Fort Smith Traction, Light and Power Co.....	July 1, 1901	June 30, 1902	7.57	7.57	200,000	200,000
3	Fort Smith, Van Buren.....	Fort Smith and Van Buren Light and Transit Co.....	July 1, 1901	June 30, 1902	1.36	1.36	38,000	33,000
4	Hot Springs.....	Hot Springs Street R. R. Co.....	Jan. 1, 1902	Sept. 30, 1902	9.28	9.28	100,000	100,000
5	Little Rock.....	Little Rock Traction and Electric Co.....	July 1, 1901	June 30, 1902	20.70	20.70	500,000	500,000
6	Pine Bluff.....	Citizens Light and Transit Co.....	Feb. 11, 1902	Nov. 30, 1902	7.75	7.75	200,000	20,000
7	Texarkana.....	Texarkana Rwy. Co.....	July 1, 1901	June 30, 1902	12.66	12.66	144,800	144,800
	CALIFORNIA.							
	Total for state.....				829.10	839.95	51,392,434	46,022,099
1	Bakersfield, Kern.....	Bakersfield and Kern Electric Rwy. Co.....	Feb. 21, 1901	Feb. 20, 1902	2.15	2.15	250,000	45,000
2	Fresno.....	Fresno City, Belmont and Yosemite R. R. Co.....	Jan. 1, 1901	Dec. 31, 1901	2.50	2.50	2,500,000	31,225
3	do.....	Fresno R. R. Co.....	Jan. 1, 1901	Dec. 31, 1901	2.90	2.90	200,000	20,550
4	Grass Valley, Nevada City.....	Nevada County Traction Co.....	Oct. 1, 1901	Sept. 30, 1902	5.10	5.10	100,000	100,000
5	Los Angeles.....	Los Angeles Electric Incline Rwy.....	Jan. 1, 1902	Dec. 31, 1902	.14	.14	60,000	60,000
6	do.....	Los Angeles Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	94.82	99.71	5,000,000	5,000,000
7	Los Angeles, Pasadena, South Pasadena.....	Los Angeles and Pasadena Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	31.86	33.74	1,000,000	1,000,000
8	Los Angeles, Santa Monica, Redondo and vicinity.....	Los Angeles Pacific R. R. Co.....	July 1, 1901	June 30, 1902	87.48	87.48	2,500,000	1,500,000
9	Los Angeles, Santa Ana, Orange.....	Pacific Electric Rwy. Co. (of Arizona).....	Jan. 1, 1901	Dec. 31, 1901	11.34	11.68	200,000	200,000
10	Los Angeles.....	Los Angeles Traction Co.....	Sept. 1, 1901	Aug. 31, 1902	26.00	29.00	500,000	500,000
11	Marysville, Yuba City.....	Marysville and Yuba City Street R. R. Co.....	May 1, 1901	Apr. 30, 1902	4.23	4.23	50,000	20,000
12	Monrovia.....	Monrovia Street Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	1.50	1.50	148,000	148,000
13	Monterey.....	Monterey and Pacific Grove Street Rwy. Co.....	July 1, 1901	June 30, 1902	4.15	4.15	180,000	90,000
14	Oakland, Alameda, Berkeley, Hayward, Emeryville.....	Oakland Transit Consolidated Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	122.80	122.80	6,900,000	6,900,000
15	Ontario.....	Ontario and San Antonio Heights Rwy. Co.....	June 1, 1901	May 31, 1902	8.00	8.00	250,000	250,000
16	Pasadena.....	Pasadena and Mt. Lowe Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	6.64	6.64	600,000	600,000
17	Paso Robles.....	Paso Robles Street Car Co.....	Aug. 1, 1901	July 31, 1902	2.50	2.50	148,000	148,000
18	Petaluma.....	Petaluma Street Rwy. Co.....	Dec. 1, 1901	Nov. 30, 1902	1.81	1.81		
19	Pomona.....	Pomona Street Rwy. Co.....	July 1, 1901	June 30, 1902	2.56	2.56	50,000	50,000
20	Redlands.....	Redlands Street Rwy. Co.....	July 1, 1901	June 30, 1902	7.27	7.27	150,000	150,000
21	Riverside.....	Riverside and Arlington Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	9.52	9.52	200,000	81,200
22	Sacramento.....	Sacramento Electric, Gas and Rwy. Co.....	Feb. 1, 1901	Jan. 31, 1902	23.50	23.50	2,500,000	1,852,500
23	San Bernardino, Colton.....	San Bernardino Valley Traction Co.....	Mar. 1, 1902	Feb. 28, 1903	7.62	7.62	500,000	500,000
24	San Diego.....	San Diego Electric Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	16.60	16.60	500,000	500,000
25	San Francisco.....	Geary Street, Park and Ocean R. R. Co.....	July 1, 1901	June 30, 1902	7.68	8.42	1,000,000	1,000,000
26	do.....	California Street Cable R. R. Co.....	July 1, 1901	June 30, 1902	10.86	10.86	1,000,000	1,000,000
27	do.....	Presidio and Ferries R. R. Co.....	Jan. 24, 1901	Jan. 23, 1902	9.01	9.01	1,000,000	1,000,000
28	San Francisco, San Mateo.....	United Railroads of San Francisco.....	July 1, 1901	June 30, 1902	248.95	248.95	22,150,000	21,857,990
29	San Jose, Willow Glen.....	San Jose R. R. Co.....	Jan. 1, 1902	Dec. 31, 1902	15.16	15.16	14235,934	14235,934
30	San Jose, Santa Clara.....	San Jose and Santa Clara R. R. Co.....	Jan. 1, 1902	Dec. 31, 1902	18.12	18.12	500,000	500,000
31	Santa Barbara.....	Santa Barbara Consolidated Rwy. Co.....	Dec. 1, 1901	Nov. 30, 1902	8.50	8.50	250,000	250,000
32	Santa Cruz.....	Santa Cruz Electric Rwy. Co.....	July 1, 1901	June 30, 1902	5.67	5.67	500,000	500,000
33	do.....	East Santa Cruz Street R. R. Co.....	Jan. 1, 1902	Dec. 31, 1902	2.85	2.85	1427,000	1427,000
34	Santa Rosa.....	Santa Rosa Street Rwy. Co. ¹	Jan. 1, 1902	Dec. 31, 1902	7.33	7.33	1423,500	1423,500
35	Stockton.....	Stockton Electric R. R. Co.....	Jan. 1, 1901	Dec. 31, 1901	11.98	11.98	500,000	161,200

¹ Includes 4.20 miles lying outside of the United States. (See Maine and Texas.)

² Exclusive of 15.95 miles shown in "owned and leased," Table 94, of which 11.43 miles is track duplicated in reports of different companies, and 4.47 miles is owned but not operated; but including 4.20 miles lying outside of the United States.

³ Capital reported for 980 companies only, and represents 22,389.04 miles of track owned by street-railway companies.

⁴ Exclusive of \$152,513,997, investments other than street railways and electric-light plants owned.

⁵ Exclusive of \$949,116, investments other than street railways and electric-light plants owned.

⁶ Includes electric-light plant and other investments.

⁷ Exclusive of \$944,195, investments other than street railways and electric-light plants owned.

⁸ Includes electric-light plant.

⁹ Not reported; obtained from street-railway journals and directories.

GENERAL TABLES.

237

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$1,355,920,066	\$1,187,642,781		\$28,737,887	\$178,279,533	\$127,930,179		\$4,301,264	\$1,341,429,727	\$992,709,139		\$2,308,282,099	\$906,287	
6,386,900	6,346,900			1,350,000	1,350,000		81,000	8,594,000	6,678,500		14,373,400	\$65,584	
136,000	136,000							159,000	129,500	5	265,500	26,550	1
3,150,000	3,150,000			1,350,000	1,350,000	6	81,000	5,400,000	4,500,000	5	\$9,000,000	73,235	2
100,000	100,000										100,000	33,003	3
100,000	60,000							100,000	72,000	6	\$132,000	19,701	4
150,000	150,000							150,000	150,000	6	\$300,000	64,935	5
2,250,000	2,250,000							2,250,000	1,397,000	5, 6	\$3,647,000	97,253	6
350,000	350,000							300,000	300,000	6	650,000	32,500	7
125,000	125,000							125,000	20,000	5	145,000	24,702	8
25,900	25,900							110,000	110,000	6	135,900	19,414	9
150,000	127,800							120,000	61,150		188,950	11,060	
100,000	100,000							\$100,000	\$50,000	5	150,000	12,500	1
50,000	27,800							20,000	11,150	7	38,950	7,637	2
1,065,300	885,300							1,438,000	1,068,000		1,943,300	\$136,251	
27,500	27,500							55,000	55,000	6	82,500	26,025	1
200,000	200,000							200,000	100,000	6	\$380,000	47,556	2
33,000	33,000							33,000	33,000	5	66,000	48,529	3
100,000	100,000							250,000	200,000	6	\$300,000	32,328	4
500,000	500,000							750,000	610,000	6	\$1,110,000	53,623	5
200,000	20,000							150,000			\$20,000	2,581	6
4,800	4,800										4,800	1,806	7
51,392,434	46,022,099		668,412					47,367,000	30,539,500		76,561,599	\$190,166	
250,000	45,000							250,000	100,000	5	145,000	67,442	1
2,500,000	31,225										31,225	12,490	2
200,000	20,550										20,550	7,086	3
100,000	100,000	1 1/2	1,500					100,000	100,000	5	200,000	39,216	4
60,000	60,000	2	1,200					12,000	9,500	6	69,500	496,429	5
5,000,000	5,000,000							5,000,000	4,520,000	5	9,520,000	100,401	6
1,000,000	1,000,000							1,000,000	1,000,000	5	2,000,000	62,775	7
2,500,000	1,500,000							1,500,000	1,500,000	5	\$3,000,000	34,294	8
200,000	200,000							200,000	60,000	5	260,000	22,928	9
500,000	500,000							500,000	500,000	5, 6	1,000,000	38,462	10
50,000	20,000										20,000	4,728	11
8,000	8,000										8,000	5,333	12
180,000	90,000	3 1/2	3,300								90,000	21,687	13
6,900,000	6,900,000							6,500,000	4,433,000	5, 6	\$11,333,000	92,268	14
250,000	250,000										\$250,000	31,250	15
600,000	600,000							600,000	441,000	4	1,041,000	156,777	16
8,000	8,000										8,000	3,200	17
								\$10,000	\$10,000		10,000	5,525	18
50,000	50,000										50,000	19,531	19
150,000	150,000							150,000	104,000	5, 6	\$254,000	34,938	20
200,000	81,200							200,000	100,000	4, 5	181,200	19,634	21
2,500,000	1,852,500	1 1/2	6,104					2,500,000	2,100,000	5, 6	\$3,952,500	\$152,328	22
500,000	500,000							250,000	185,000	5	685,000	89,495	23
500,000	500,000										500,000	30,120	24
1,000,000	1,000,000	3 1/2	85,000					1,000,000	671,000	5	\$1,671,000	217,578	25
1,000,000	1,000,000	8	80,000					1,000,000	900,000	5	\$1,900,000	174,954	26
1,000,000	1,000,000	2 1/2	24,000					250,000	150,000	6	\$1,150,000	127,636	27
22,150,000	21,857,990	2 1/2	496,808					25,450,000	13,091,000	5, 6	\$34,948,990	140,386	28
235,934	235,934										235,934	13,563	29
500,000	500,000							250,000	250,000	6	750,000	41,391	30
250,000	250,000							250,000	160,000	5	410,000	48,235	31
500,000	500,000							280,000	40,000	6	540,000	95,238	32
27,000	27,000										27,000	9,474	33
23,500	23,500										23,500	8,206	34
500,000	161,200	3 1/2	5,500					115,000	115,000	6	276,200	23,065	35

¹ Exclusive of 1.16 miles lying outside of state. Total owned and operated by companies in state, 52.49 miles.

² Exclusive of \$40,486, investments other than street railways and electric-light plants owned.

³ Includes investments other than street railways.

⁴ Includes 1.16 miles in Texas.

⁵ Cash investment.

⁶ Exclusive of \$1,806,168, investments other than street railways and electric-light plants owned.

⁷ Floating debt.

⁸ Exclusive of \$372,792, investments other than street railways and electric-light plants owned.

⁹ Including Central Street Rwy. Co. and Union Street Rwy. Co.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
COLORADO.								
Total for state.....					234.53	234.53	\$8,185,904	\$7,562,804
1	Boulder	Boulder Railway and Utility Co	June 1, 1901	May 31, 1902	4.08	4.08	250,000	200,000
2	Colorado Springs, Cripple Creek, Victor.	Colorado Springs and Cripple Creek District Rwy. Co. ²	July 1, 1901	June 30, 1902	11.78	11.78	560,000	560,000
3	Colorado Springs, Colorado City, Manitou.	Colorado Springs Rapid Transit Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	27.46	29.01	500,000	500,000
3a	.....	Manitou Electric Railway and Casino Co. (lessor).	May 1, 1901	Apr. 30, 1902	1.55	.....	125,000	125,000
4	Denver	Denver, Lakewood and Golden R. R. Co. ²	July 1, 1901	June 30, 1902	6.00	6.00	(^b)	(^b)
5	do	Denver City Tramway Co	Jan. 1, 1901	Dec. 31, 1901	143.77	143.77	5,000,000	5,000,000
6	Durango, Animas	Durango Railway and Realty Co.	Aug. 1, 1901	July 31, 1902	2.39	2.39	250,000	176,900
7	Grand Junction	Grand Junction Street Car System (municipal)	June 1, 1901	May 31, 1902	1.25	1.25	*904	*904
8	Pueblo	Pueblo Traction and Lighting Co	July 1, 1901	June 30, 1902	36.25	36.25	1,500,000	1,000,000
CONNECTICUT.								
Total for state					578.49	593.43	*31,932,000	*25,211,640
1	Branford	Branford Lighting and Water Co.	July 1, 1901	June 30, 1902	6.51	6.51	500,000	300,000
2	Bridgeport, Waterbury, Naugatuck, Greenwich, Derby, South Norwalk, Norwalk, Westport, Southington.	Connecticut Railway and Lighting Co.	July 1, 1901	June 30, 1902	159.28	159.28	15,000,000	15,000,000
3	Bristol, Plainville, Southington ..	Bristol and Plainville Tramway Co	July 1, 1901	June 30, 1902	7.92	7.92	1,000,000	50,000
4	Danbury, Bethel	Danbury and Bethel Street Rwy. Co.	July 1, 1901	June 30, 1902	11.78	11.78	\$23,000	\$20,000
5	Greenwich	Greenwich Tramway Co	Aug. 14, 1901	June 30, 1902	5.76	5.76	600,000	125,000
6	Enfield, East Windsor	Hartford and Springfield Street Rwy. Co.	July 1, 1901	June 30, 1902	13.47	13.47	500,000	400,000
7	Hartford, Farmington, Unionville ..	Farmington Street Rwy. Co	July 1, 1901	June 30, 1902	10.80	14.60	189,000	189,000
8	Hartford, Glastonbury, Windsor, South Windsor, West Hartford, Wethersfield.	Hartford Street Rwy. Co	July 1, 1901	June 30, 1902	77.47	93.92	2,000,000	1,000,000
8a	.....	East Hartford and Glastonbury Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	10.20	.....	.....	.....
9	Hartford, Manchester, Rockville ..	Hartford, Manchester and Rockville Tramway Co.	July 1, 1901	June 30, 1902	17.34	18.18	500,000	300,000
9a	.....	South Manchester Light, Power and Tramway Co. (lessor).	July 1, 1901	June 30, 1902	.79	.....	100,000	10,000
10	Hartford, New Britain, Bristol, Plainville.	New York, New Haven and Hartford R.R. Co. (Berlin System).	July 1, 1901	June 30, 1902	25.89	25.89	(^b)	(^b)
11	Meriden, Southington	Meriden, Southington and Compounce Tramway Co.	July 1, 1901	June 30, 1902	12.34	14.39	500,000	200,000
12	Meriden, Wallingford	Meriden Electric R. R. Co	July 1, 1901	June 30, 1902	19.50	19.50	1,000,000	1,000,000
13	Middletown, Portland	Middletown Street Rwy. Co	July 1, 1901	June 30, 1902	9.93	9.93	200,000	135,000
14	New Haven	Manufacturers R. R. Co.	July 1, 1901	June 30, 1902	1.36	1.36	20,000	20,000
15	New Haven, East Haven, Hamden, North Haven.	Fairhaven and Westville R. R. Co	July 1, 1901	June 30, 1902	71.23	96.67	5,000,000	3,790,400
15a	.....	Winchester Avenue R. R. Co. (lessor).	July 1, 1901	June 30, 1902	19.95	.....	1,000,000	800,000
15b	.....	West Shore Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	4.49	.....	200,000	80,000
16	New London	New London Street Rwy. Co	July 1, 1901	June 30, 1902	8.51	8.51	500,000	250,000
17	Norwich, New London, Montville, Waterford.	Montville Street Rwy. Co.	July 1, 1901	June 30, 1902	10.67	13.51	300,000	250,000
18	Norwich, Sprague	Norwich Street Rwy. Co	July 1, 1901	June 30, 1902	17.65	17.65	600,000	250,000
19	Putnam, Thompson, Killingly	Peoples Tramway Co	July 1, 1901	June 30, 1902	16.44	16.44	400,000	400,000
20	Stamford, Greenwich	Stamford Street R. R. Co	July 1, 1901	June 30, 1902	12.69	12.69	200,000	92,240
21	Stamford, New Canaan	New York, New Haven and Hartford R. R. Co. (New Canaan Branch).	July 1, 1901	June 30, 1902	8.63	8.63	(^b)	(^b)
22	Suffield	Suffield Street Rwy. Co	Feb. 1, 1902	June 30, 1902	4.91	4.91	300,000	50,000
23	Torrington, Winchester	Torrington and Winchester Street Rwy. Co.	July 1, 1901	June 30, 1902	13.03	13.03	1,000,000	200,000
DELAWARE.								
Total for state					85.61	89.66	2,270,000	2,264,990
1	Wilmington, Newcastle, Delaware City.	Wilmington and New Castle Electric Rwy. Co.	Oct. 1, 1900	Sept. 30, 1901	13.45	17.50	250,000	244,990
2	Wilmington and vicinity	Peoples Rwy. Co	June 1, 1901	May 31, 1902	31.38	31.38	1,500,000	1,500,000
3	do	Wilmington City Rwy. Co., including Front and Union Streets Passenger Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	40.78	40.78	520,000	520,000
DISTRICT OF COLUMBIA.								
Total for district					14146.17	14152.87	17,704,000	17,543,550
1	Washington	Anacostia and Potomac River R. R. Co.	Jan. 1, 1901	Dec. 31, 1901	18.10	22.90	2,000,000	2,000,000
2	do	Brightwood Rwy. Co	Jan. 1, 1901	Dec. 31, 1901	11.69	11.69	204,000	108,500
3	do	Capital Traction Co	Jan. 1, 1901	Dec. 31, 1901	1540.69	1541.36	12,000,000	12,000,000
4	do	City and Suburban Railway of Washington	Jan. 1, 1901	Dec. 31, 1901	1631.80	1632.62	1,750,000	1,750,000
5	do	Columbia Rwy. Co	Jan. 1, 1901	Dec. 31, 1901	14.72	14.72	400,000	400,000
6	do	Georgetown and Tennallytown Rwy. Co ..	Jan. 1, 1901	Dec. 31, 1901	8.32	8.32	200,000	200,000
7	do	Metropolitan R. R. Co	Jan. 1, 1901	Dec. 31, 1901	22.67	23.08	1,000,000	998,250
8	do	Washington and Great Falls Electric Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	1713.98	1713.98	150,000	86,800

¹ Capital reported for 8 companies only, representing 228.53 miles of track owned. (See note 5.)

² Exclusive of \$210,062, investments other than street railways and electric-light plants owned.

³ Primarily a steam railroad.

⁴ Includes investments other than street railways.

⁵ Capitalization included in that of steam railroad.

⁶ Cash investment.

⁷ Includes electric-light plant and other investments.

⁸ Capital reported for 25 companies only, representing 543.97 miles of track owned. (See note 5.)

⁹ Exclusive of \$2,121,530, investments other than street railways and electric-light plants owned.

GENERAL TABLES.

239

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$7,961,904	\$7,338,804		\$181,250	\$224,000	\$224,000			\$13,065,000	\$9,395,560		\$15,956,364	\$68,911	
250,000	200,000			224,000	224,000			200,000	100,000	5	300,000	73,529	1
336,000	336,000							840,000	833,560	5	1,393,560	118,299	2
500,000	500,000							500,000	500,000	6	\$1,000,000	36,417	3
125,000	125,000	1	1,250					25,000	25,000	6	\$150,000	96,774	3a
5,000,000	5,000,000	3	150,000					(⁵)	(⁵)				4
250,000	176,900							10,000,000	5,837,000	5, 6	10,837,000	75,377	5
904	904										\$176,900	74,017	6
1,500,000	1,000,000	3	30,000					1,500,000	1,100,000	5	\$2,100,000	57,931	8
27,832,000	21,166,590		275,082	4,100,000	4,045,050			24,801,000	17,433,500		\$42,645,140	\$74,496	
500,000	300,000							400,000	300,000	5	\$600,000	\$65,093	1
11,000,000	11,000,000			4,000,000	4,000,000			15,000,000	9,350,000	4 1/2, 5, 6	\$24,350,000	152,875	2
1,000,000	50,000	6	3,000					200,000	67,500	5	117,500	14,836	3
323,000	320,000	3	9,600					200,000	200,000	5	520,000	44,331	4
600,000	125,000							400,000	150,000	5	275,000	47,743	5
500,000	400,000							600,000	400,000	5	800,000	59,391	6
189,000	189,000										189,000	\$14,563	7
2,000,000	1,000,000	6	60,000					3,000,000	2,500,000	4	3,500,000	45,179	8
								200,000	200,000	5	200,000	19,608	8a
500,000	300,000							300,000	200,000	5	500,000	28,835	9
100,000	10,000										10,000	12,658	9a
								(⁵)	(⁵)				10
500,000	200,000	3	6,000					200,000	175,000	5	375,000	30,389	11
1,000,000	1,000,000							600,000	500,000	5	1,500,000	76,923	12
200,000	135,000							200,000	150,000	5	\$255,000	28,701	13
20,000	20,000							13,000	13,000	5	33,000	24,265	14
5,000,000	3,790,400	3	113,712					1,133,000	1,133,000	5	4,923,400	\$45,187	15
1,000,000	800,000	5	40,000					500,000	500,000	5	1,300,000	65,163	15a
200,000	80,000	5	4,000					30,000	30,000	5	110,000	24,499	15b
500,000	250,000	5	12,500					150,000	140,000	5	390,000	45,828	16
300,000	250,000	6	15,000					350,000	250,000	5	500,000	46,860	17
600,000	250,000	4 1/2	11,250					350,000	350,000	5	600,000	33,994	18
400,000	400,000			100,000	45,050			600,000	600,000	5	1,000,000	60,827	19
100,000	47,190							75,000	75,000	5	167,240	13,179	20
								(⁵)	(⁵)				21
300,000	50,000							150,000			50,000	10,183	22
1,000,000	200,000							150,000	150,000	5	350,000	26,861	23
2,270,000	2,264,990		9,331					2,424,000	2,424,000		4,688,990	54,772	
250,000	244,990	6	\$9,331					300,000	300,000	5	544,990	40,520	1
1,500,000	1,500,000							1,524,000	1,524,000	5	3,024,000	96,367	2
520,000	520,000							600,000	600,000	4	1,120,000	27,464	3
17,704,000	17,543,550		602,827					10,550,000	9,290,000		26,823,550	165,608	
2,000,000	2,000,000							3,000,000	2,250,000	5	4,250,000	234,807	1
204,000	108,500							850,000	350,000	6	458,500	39,222	2
12,000,000	12,000,000	4	480,000					1,500,000	1,080,000	4	13,080,000	\$21,455	3
1,750,000	1,750,000							1,750,000	1,750,000	5	3,500,000	110,063	4
400,000	400,000	6	24,000					1,000,000	1,000,000	5, 6	1,400,000	95,109	5
200,000	200,000							100,000	100,000	6	300,000	36,058	6
1,000,000	998,250	9 1/2	\$98,827					2,350,000	2,350,000	5, 6	3,548,250	147,695	7
150,000	86,800							500,000	400,000	6	486,800	34,821	8

¹⁰ Exclusive of \$176,243, investments other than street railways and electric-light plants owned.¹¹ Exclusive of \$31,500, investments other than street railways.¹² Exclusive of \$1,704,734, investments other than street railways.¹³ Stock not all issued at time dividend was declared.¹⁴ Exclusive of 19.40 miles lying outside of district, but including 3.60 miles in district owned by outside companies. Total owned by companies in the district, 161.97 miles; total operated, 168.67 miles.¹⁵ Includes 3.65 miles in Maryland.¹⁶ Includes 9.53 miles in Maryland.¹⁷ Includes 6.22 miles in Maryland.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
FLORIDA.								
Total for state					61.75	61.75	\$1,949,400	\$1,949,400
1	Fort Meade	Fort Meade Street Rwy. Co	Jan. 1, 1902	Dec. 31, 1902	1.25	1.25	6,000	6,000
2	Jacksonville	Jacksonville Electric Co	Mar. 1, 1902	Dec. 31, 1902	18.15	18.15	1,000,000	1,000,000
3	Key West	Key West Electric Co	July 1, 1901	June 30, 1902	3.74	3.74	300,000	300,000
4	Palatka	Palatka and Heights Street Rwy. Co	Feb. 1, 1901	Jan. 31, 1902	3.50	8.50	10,000	10,000
5	Pensacola	Pensacola Electric Terminal Rwy. Co	July 1, 1901	June 30, 1902	9.00	9.00	133,400	133,400
6	Tampa, West Tampa, Port Tampa, Fort Brook	Tampa Electric Co	Jan. 1, 1902	Dec. 31, 1902	26.11	26.11	500,000	500,000
GEORGIA.								
Total for state					*305.88	*308.38	13,029,000	12,957,600
1	Athens	Athens Electric Rwy. Co	Jan. 1, 1901	Dec. 31, 1901	6.53	6.53	100,000	75,000
2	Atlanta, Decatur, College Park, Augusta	Georgia Railway and Electric Co	July 1, 1901	June 30, 1902	150.00	153.00	6,800,000	6,800,000
3	Augusta, Summerville	Augusta Railway and Electric Co	Nov. 1, 1901	Oct. 31, 1902	31.02	31.02	1,000,000	1,000,000
4	Columbus	Columbus R. R. Co	Jan. 1, 1902	Dec. 31, 1902	17.00	17.00	250,000	250,000
5	Covington, Oxford	Covington and Oxford Street Rwy. Co	Feb. 15, 1901	Feb. 14, 1902	2.25	2.25	20,000	13,600
6	Macon and vicinity	Macon Railway and Light Co	Jan. 1, 1902	Dec. 31, 1902	30.67	30.67	1,200,000	1,200,000
7	Rome	City Electric Rwy. Co	Jan. 1, 1901	Dec. 31, 1901	6.28	6.28	100,000	60,000
8	Savannah and vicinity	Savannah Electric Co	Jan. 1, 1902	Dec. 31, 1902	53.05	53.05	3,500,000	3,500,000
9	Valdosta	Valdosta Street Rwy. Co	Jan. 1, 1902	Dec. 31, 1902	2.08	2.08	50,000	50,000
10	Washington	Washington Street Rwy. Co	Jan. 1, 1902	Dec. 31, 1902	1.50	1.50	9,000	9,000
IDAHO.								
Total for state					3.50	3.50	200,000	55,300
1	Boise	Boise Rapid Transit Co	July 1, 1901	June 30, 1902	3.50	3.50	200,000	55,300
ILLINOIS.								
Total for state					*1,650.35	*1,713.39	206,518,173	160,527,416
1	Alton, North Alton	Alton Railway, Gas and Electric Co	July 1, 1901	June 30, 1902	12.25	12.25	300,000	300,000
2	Aurora, Yorkville, Batavia, Elgin, Carpentersville, Bloomington, Normal	Elgin, Aurora and Southern Traction Co	July 1, 1901	June 30, 1902	62.96	62.96	2,000,000	2,000,000
3	Bloomington and Normal	Bloomington and Normal Railway, Electric and Heating Co	June 1, 1902	Nov. 30, 1902	21.00	21.00	300,000	250,000
4	Buffalo, Mechanicsburg	Mechanicsburg and Buffalo Street Rwy. Co	Mar. 1, 1901	Feb. 28, 1902	3.70	3.70	12,000	12,000
5	Calro	Cairo Electric Rwy. Co	July 1, 1901	June 30, 1902	5.67	5.67	75,000	52,400
6	do	Egypt Electric Co	July 1, 1901	June 30, 1902	4.00	4.00	40,000	40,000
7	Centralia, Central City	Centralia and Central City Street Rwy. Co	Jan. 1, 1902	Dec. 31, 1902	3.42	3.42	10,000	8,260
8	Champaign, Urbana	Urbana and Champaign Railway, Gas and Electric Co	May 1, 1901	Apr. 30, 1902	9.00	9.00	200,000	200,000
9	Chicago	Chicago City Rwy. Co	Jan. 1, 1901	Dec. 31, 1901	222.50	222.50	18,000,000	18,000,000
10	do	Chicago Union Traction Co	July 1, 1901	June 30, 1902	305.32	305.32	32,000,000	32,000,000
10a	do	Chicago Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	33.61	33.61	2,000,000	1,340,300
10b	do	Chicago West Division Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	96.36	96.36	1,250,000	1,250,000
10c	do	North Chicago City Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	46.96	46.96	500,000	500,000
10d	do	North Chicago Street R. R. Co. (lessor)	July 1, 1901	June 30, 1902	47.12	47.12	10,000,000	7,920,000
10e	do	West Chicago Street R. R. Co. (lessor)	July 1, 1901	June 30, 1902	81.10	81.10	20,000,000	13,189,000
11	do	Chicago Consolidated Traction Co	Jan. 1, 1901	Dec. 31, 1901	166.24	206.51	15,000,000	15,000,000
11a	do	Chicago and North Shore Street Rwy. Co. (lessor)	Jan. 1, 1901	Dec. 31, 1901	14.92	14.92	650,000	650,000
12	do	Calumet Electric Street Rwy. Co	May 1, 1901	Apr. 30, 1902	*79.32	*80.94	500,000	500,000
13	do	Chicago Electric Traction Co	July 1, 1901	June 30, 1902	28.50	26.88	250,000	250,000
14	do	Chicago General Rwy. Co	July 1, 1901	June 30, 1902	21.14	25.74	10,000,000	500,000
15	do	Chicago General Electric Rwy. Co	July 1, 1901	June 30, 1902	1.50	1.50	5,000,000	8,000
16	do	Suburban R. R. Co	July 1, 1901	June 30, 1902	1043.59	1043.59	1,250,000	1,250,000
17	do	Northwestern Elevated R. R. Co	July 1, 1901	June 30, 1902	29.57	30.37	30,000,000	10,000,000
18	do	South Side Elevated R. R. Co	July 1, 1901	June 30, 1902	21.08	23.06	10,323,800	10,323,800
19	do	Metropolitan West Side Elevated Rwy. Co	July 1, 1901	June 30, 1902	38.96	41.34	16,500,000	16,208,100
19a	do	Union Consolidated Elevated Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	.38	.38	1,000,000	1,000,000
20	Chicago: Hammond (Ind.)	South Chicago City Rwy. Co	Apr. 1, 1901	Mar. 31, 1902	38.42	38.42	112,000,000	11,603,800
21	Chicago: Evanston, Waukegan	Chicago and Milwaukee Electric Rwy. Co	July 1, 1901	June 30, 1902	43.00	44.50	1,000,000	1,000,000
22	Chicago	Lake Street Elevated R. R. Co. (includes Chicago and Harlem R.R.)	July 1, 1901	June 30, 1902	20.97	26.49	10,000,000	10,000,000
23	Chicago, Joliet	Chicago and Joliet Electric Rwy. Co	July 1, 1901	June 30, 1902	38.92	62.89	2,300,000	2,300,000
23a	Chicago, Lemont	Chicago and Des Plaines Valley Electric Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	23.97	23.97	1,100,000	1,100,000
24	Chicago	Northern Electric Rwy. Co	July 1, 1901	June 30, 1902	4.00	4.00	50,000	50,000
25	Danville, Germantown	Danville Street Railway and Light Co	Jan. 1, 1901	Dec. 31, 1901	12.50	12.50	700,000	700,000
26	Danville, Westville	Danville, Paxton and Northern R. R. Co	Jan. 1, 1902	June 30, 1902	13.50	14.00	250,000	250,000
27	Decatur	Decatur Traction and Electric Co	Jan. 1, 1902	Dec. 31, 1902	13.50	13.50	250,000	250,000
28	East St. Louis	East St. Louis Rwy. Co	July 1, 1901	June 30, 1902	19.95	19.95	1,500,000	1,500,000
29	East St. Louis, Belleville	St. Louis and Belleville Electric Rwy. Co	July 1, 1901	June 30, 1902	21.49	21.49	750,000	750,000
30	East St. Louis, Belleville, Edwardsville, Collinsville	East St. Louis and Suburban Rwy. Co	July 1, 1901	June 30, 1902	53.60	58.22	2,975,000	2,975,000
31	East St. Louis; St. Louis (Mo.)	St. Louis and East St. Louis Electric Rwy. Co	July 1, 1901	June 30, 1902	12.12	12.12	500,000	500,000

¹ Includes electric-light plant.

² Includes 5 miles in state owned by outside companies. Total owned by companies in state, 300.38 miles; total operated, 303.38 miles.

³ Includes electric-light plant and other investments.

⁴ See South Carolina.

⁵ Exclusive of 6.85 miles lying outside of state, but including 31 miles in state owned by outside companies. Total owned by companies in state, 1,635.20 miles including 12.79 miles leased from steam railroad (see note 10); total operated, 1,689.24 miles.

⁶ Exclusive of \$40,237,103, investments other than street railways and electric-light plants owned.

GENERAL TABLES.

241

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$1,749,400	\$1,749,400		\$40,720	\$200,000	\$200,000			\$2,304,000	\$1,531,000		\$3,480,400	\$56,363	
6,000	6,000	12	720								6,000	4,800	1
800,000	800,000			200,000	200,000			1,250,000	700,000	5	1,700,000	93,664	2
300,000	300,000							300,000	200,000	5	1,500,000	133,690	3
10,000	10,000										10,000	2,857	4
133,400	133,400							254,000	254,000	5, 6	387,400	43,044	5
500,000	500,000	8	40,000					500,000	377,000	6	1,877,000	33,589	6
9,929,000	9,857,600		952	3,100,000	3,100,000		\$33,000	17,700,000	13,061,500		\$26,039,100	86,687	
100,000	75,000							400,000	200,000	6	1,275,000	42,113	1
5,000,000	5,000,000			1,900,000	1,800,000			11,000,000	7,850,000	5	\$14,650,000	97,667	2
1,000,000	1,000,000							1,000,000	1,000,000	5	12,000,000	64,475	3
250,000	250,000							700,000	680,000	5, 6	1,930,000	54,706	4
20,000	13,600	7	952								13,600	6,044	5
900,000	900,000			300,000	300,000	6	18,000	1,000,000	751,500	5	\$1,951,500	63,629	6
100,000	60,000							100,000	100,000	5	1,160,000	25,478	7
2,500,000	2,500,000			1,000,000	1,000,000	14	15,000	3,500,000	2,500,000	4, 5, 6	16,000,000	113,101	8
50,000	50,000										50,000	24,038	9
9,000	9,000										9,000	6,000	10
200,000	55,300										55,300	15,800	
200,000	55,300										55,300	15,800	1
159,518,173	134,819,316		4,484,722	46,000,000	25,708,100		261,243	134,616,667	99,558,267		260,085,683	\$135,507	
300,000	300,000							300,000	300,000	5	600,000	48,980	1
2,000,000	2,000,000							2,000,000	2,000,000	5	14,000,000	63,532	2
300,000	250,000							300,000	250,000	5	500,000	23,810	3
12,000	12,000	41	515								12,000	3,243	4
75,000	52,400							75,000	26,200	6	7,600	13,862	5
40,000	40,000										\$40,000	10,000	6
10,000	8,260							4,000	4,000	5	12,260	3,565	7
200,000	200,000	2	4,000					200,000	200,000	5	1,400,000	44,444	8
18,000,000	18,000,000	9	1,620,000								18,000,000	80,899	9
20,000,000	20,000,000			12,000,000	12,000,000						32,000,000		10
2,000,000	1,840,300	5	67,015					2,000,000	1,706,000	5	3,046,300		10a
1,250,000	1,250,000	35	437,500					5,000,000	4,070,000	5	5,320,000		10b
500,000	500,000	30	150,000					3,000,000	3,000,000	5	3,500,000		10c
10,000,000	7,920,000	12	950,400					4,800,000	4,800,000	5	12,720,000		10d
20,000,000	13,189,000	6	791,340					\$12,181,000	\$12,181,000	5	25,370,000		10e
15,000,000	15,000,000							11,944,000	11,770,000	4, 5, 6	26,770,000	161,032	11
650,000	650,000	6	39,000					675,000	675,000	6	1,325,000	88,807	11a
500,000	500,000							3,000,000	3,000,000	5	3,500,000	44,125	12
250,000	250,000										250,000	8,772	13
10,000,000	500,000							10,500,000	1,727,500	5, 6	2,227,500	105,369	14
5,000,000	8,000										8,000	5,333	15
1,250,000	1,250,000							3,000,000	1,250,000	5	2,500,000	81,169	16
5,000,000	5,000,000			25,000,000	5,000,000			30,000,000	18,387,000	4, 5	28,387,000	959,993	17
10,323,800	10,323,800	4	412,952					1,500,000	750,000	41	\$11,073,800	525,323	18
7,500,000	7,500,000			9,000,000	8,708,100	3	261,243	15,000,000	11,308,000	4	27,516,100	706,265	19
1,000,000	1,000,000							1,000,000	407,000	5	1,407,000	3,702,632	19a
2,000,000	1,603,800							\$15,050,000	\$11,563,000	5	3,166,800	82,426	20
1,000,000	1,000,000							1,500,000	1,000,000	5	2,000,000	46,512	21
10,000,000	10,000,000							7,121,000	5,728,050	5	15,728,050	750,026	22
2,300,000	2,300,000							2,000,000	2,000,000	5, 6	4,300,000	110,483	23
1,100,000	1,100,000							1,000,000	1,000,000	5	2,100,000	87,610	23a
50,000	50,000							50,000	50,000	6	100,000	25,000	24
700,000	700,000							700,000	670,000	5	\$1,370,000	109,600	25
250,000	250,000							250,000	109,000	5	359,000	26,593	26
250,000	250,000							250,000	211,850	5	461,850	34,211	27
1,500,000	1,500,000							1,500,000	1,500,000	5	3,000,000	150,376	28
750,000	750,000							750,000	750,000	5	1,500,000	69,800	29
2,975,000	2,975,000							3,000,000	2,900,000	5	\$5,875,000	108,608	30
500,000	500,000							500,000	500,000	5	1,000,000	471,698	31

* Includes investments other than street railways.

* Includes \$1,500,000 bonds of West Chicago Street R. R. Tunnel Co.

* Includes .50 mile in Indiana.

* Includes 12.79 miles leased from steam railroad.

* Not reported; obtained from street-railway journals and directories.

* Owned by bridge company; entire trackage is on bridge and includes .85 mile in Missouri.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
ILLINOIS—Continued.								
32	East St. Louis, Venice, Madison, Granite.	Granite City and St. Louis Rwy. Co.	June 1, 1902	Dec. 1, 1902	13.25	13.25	\$500,000	\$500,000
33	Freeport.	Freeport Electric Co.	Sept. 1, 1901	Aug. 31, 1902	7.50	7.50	121,456	121,456
34	Galesburg.	Galesburg Electric Motor and Power Co.	July 1, 1901	June 30, 1902	17.00	17.00	210,000	210,000
35	Harvard; Walworth (Wis.).	Chicago, Harvard and Geneva Lake Rwy. Co.	July 1, 1901	June 30, 1902	11.12	11.12	150,000	150,000
36	Jacksonville.	Jacksonville Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	5.19	5.19	75,000	33,450
37	Kankakee.	Kankakee Electric Rwy. Co.	July 1, 1901	June 30, 1902	8.45	8.45	60,000	50,000
38	Kankakee, Bradley.	North Kankakee Electric Light and Rwy. Co.	July 1, 1901	June 30, 1902	4.33	4.33	100,000	32,600
39	Lincoln.	Lincoln Street Car Co.	July 1, 1902	Nov. 1, 1902	7.05	7.05	140,000	140,000
40	Marion, Carterville, Spillertown.	Coal Belt Electric Rwy. Co.	Sept. 1, 1901	June 30, 1902	17.30	17.30	300,000	300,000
41	Murphysboro.	Murphysboro Street Rwy. Co.	July 1, 1901	June 30, 1902	1.55	1.55	19,250	19,250
42	Ottawa.	Ottawa Railway, Light and Power Co.	Jan. 1, 1902	Dec. 31, 1902	8.50	8.50	150,000	150,000
43	Peoria.	Peoria and Prospect Heights Rwy. Co.	Dec. 1, 1900	Nov. 30, 1901	6.25	6.50	100,000	100,000
44	do.	Central Rwy. Co.	Apr. 1, 1901	Mar. 31, 1902	35.00	35.00	750,000	750,000
45	Peoria, Pekin.	Peoria and Pekin Terminal Rwy. Co.	July 1, 1901	June 30, 1902	8.68	14.18	466,667	400,000
46	Quincy.	Quincy Horse Railway and Carrying Co.	Jan. 1, 1901	Dec. 31, 1901	17.38	17.38	600,000	600,000
47	Rockford.	Rockford Railway, Light and Power Co.	Jan. 1, 1901	Dec. 31, 1901	23.00	23.00	350,000	350,000
48	do.	Rockford and Belvidere Electric Rwy. Co.	May 1, 1902	June 30, 1902	13.53	14.78	200,000	200,000
49	Springfield, Ridgely.	Springfield Consolidated Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	23.83	23.83	750,000	750,000
50	Streator.	Peoples Light and Rwy. Co.	Aug. 27, 1901	June 30, 1902	5.50	5.50	150,000	150,000
INDIANA								
Total for state					656.63	679.47	19,474,710	16,935,028
1	Brownstown.	Brownstown and Ewing Street Rwy. Co.	July 1, 1901	June 30, 1902	1.00	1.00	5,000	3,460
2	Columbus.	John S. Crump Electric Street Railway and Light Plant.	July 1, 1901	June 30, 1902	4.40	4.40	144,820	144,820
3	Evansville, Howell.	Evansville Electric Rwy. Co.	Nov. 1, 1901	Oct. 31, 1902	30.50	30.50	600,000	600,000
4	Fort Wayne.	Fort Wayne Traction Co.	Jan. 1, 1901	Dec. 31, 1901	32.00	32.00	2,000,000	2,000,000
5	Fort Wayne, Huntington.	Fort Wayne and Southwestern Traction Co.	Jan. 1, 1902	June 30, 1902	26.62	26.62	1,000,000	1,000,000
6	Hammond, East Chicago, Whiting.	Hammond, Whiting and East Chicago Electric Rwy. Co.	Apr. 1, 1901	Mar. 31, 1902	24.90	24.90	300,000	300,000
7	Indianapolis.	Indianapolis Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	109.86	109.86	5,000,000	4,995,500
8	Indianapolis, Broad Ripple.	Broad Ripple Traction Co.	July 1, 1901	June 30, 1902	7.20	7.20	100,000	100,000
9	Indianapolis, Shelbyville.	Indianapolis, Shelbyville and Southeastern Traction Co.	Oct. 1, 1902	Dec. 31, 1902	27.55	30.05	600,000	600,000
10	Indianapolis, Greenfield.	Indianapolis and Eastern Rwy. Co.	July 1, 1901	June 30, 1902	18.04	28.24	400,000	400,000
11	Indianapolis, Anderson, Muncie, Marion, Alexandria, Elwood.	Union Traction Co. of Indiana.	July 1, 1901	June 30, 1902	142.92	150.06	5,000,000	4,632,475
12	Indianapolis, Greenwood, Franklin.	Indianapolis, Greenwood and Franklin R. R. Co.	July 1, 1901	June 30, 1902	19.00	22.00	285,000	150,000
13	Jeffersonville, Port Fulton.	Jeffersonville City Rwy. Co.	July 1, 1901	June 30, 1902	1.79	1.79	50,000	16,000
14	Kokomo.	Kokomo Railway and Light Co.	Jan. 1, 1902	Dec. 31, 1902	10.75	10.75	56,000	56,000
15	Lafayette, West Lafayette, Soldiers Home.	Lafayette Street Rwy. Co.	Feb. 1, 1901	Jan. 31, 1902	14.66	14.66	450,000	300,050
16	Logansport.	Logansport Rwy. Co.	Apr. 1, 1902	July 31, 1902	6.16	6.16	100,000	100,000
17	do.	Logansport, Rochester and Northern Traction Co.	July 1, 1902	Dec. 31, 1902	6.00	6.00	100,000	100,000
18	Madison, West Madison.	Madison Light and Rwy. Co.	Nov. 1, 1900	Oct. 31, 1901	4.00	4.00	75,000	75,000
19	Michigan City.	Lake Cities Electric Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	2.06	2.06	100,000	83,333
20	New Albany.	Highland R. R. Co.	July 1, 1901	June 30, 1902	2.00	2.00	25,000	24,500
21	do.	New Albany Street R. R. Co.	July 1, 1901	June 30, 1902	6.11	6.11	300,000	300,000
22	Richmond, Milton, Cambridge City.	Richmond Street and Interurban Rwy. Co.	July 1, 1901	June 30, 1902	30.50	30.50	600,000	400,000
23	South Bend, Mishawaka, Elkhart, Goshen.	Indiana Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	48.75	48.75	1,000,000	1,000,000
24	Terre Haute, Brazil.	Terre Haute Electric Co.	July 1, 1901	June 30, 1902	38.09	38.09	1,000,000	1,000,000
25	Vincennes.	Vincennes Citizens Street Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	8.00	8.00	15,050	15,050
26	Wabash, Peru.	Wabash River Traction Co.	Aug. 1, 1901	July 31, 1902	19.85	19.85	350,000	20,000
27	Washington.	Washington Street Rwy. Co.	Dec. 1, 1901	Nov. 30, 1902	3.95	3.95	118,840	118,840
IOWA.								
Total for state					341.35	350.00	11,039,700	10,541,200
1	Boone.	Boone Electric Street Railway and Light Co. (including Boone Suburban Rwy.).	Jan. 1, 1901	Dec. 31, 1901	6.50	6.50	200,000	95,000
2	Burlington.	Burlington Railway and Light Co.	Jan. 1, 1901	Dec. 31, 1901	14.50	14.50	600,000	600,000
3	Cedar Rapids, Marion.	Cedar Rapids and Marion City Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	13.79	13.79	400,000	316,000
4	Centerville.	Peoples Street Rwy. Co.	July 1, 1901	June 30, 1902	1.62	1.62	12,000	12,000
5	Clinton.	State Electric Co.	Jan. 1, 1902	Dec. 31, 1902	8.52	8.52	500,000	500,000
6	Council Bluffs, East Omaha.	Omaha and Council Bluffs Railway and Bridge Co.	July 1, 1901	June 30, 1902	32.40	33.40	1,500,000	1,500,000
7	Davenport; Rock Island, Moine (Ill.).	Tri-City Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	50.40	50.40	1,200,000	1,200,000
8	Des Moines.	Des Moines City Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	63.37	63.37	1,305,000	1,305,000
9	Des Moines, Colfax.	Interurban Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	24.16	31.81	508,700	508,700
10	Dubuque.	Union Electric Co.	July 1, 1901	June 30, 1902	20.85	20.85	1,000,000	1,000,000
11	Fort Dodge.	Fort Dodge Light and Power Co.	July 1, 1901	June 30, 1902	1.50	1.50	125,000	125,000
12	Fort Madison.	Fort Madison Street Rwy. Co.	June 1, 1901	May 31, 1902	4.00	4.00	100,000	100,000
13	Independence.	Independence and Rush Park Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	3.40	3.40	25,000	25,000

1 Cash investment.

2 Not reported; obtained from street railway journals and directories.

3 Includes electric-light plant.

4 Includes 5.50 miles in Wisconsin.

5 Includes 9.97 miles in state owned by outside companies. Total owned by companies in state, 646.66 miles; total operated, 669.50 miles.

6 Includes investments other than street railways.

7 Floating debt; stock and bonds not yet issued.

GENERAL TABLES.

243

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$500,000	\$500,000							\$500,000	\$350,000	5	\$850,000	\$64,151	32
21,456	21,456										21,456	2,861	33
210,000	210,000							\$125,000	\$110,000		\$320,000	18,824	34
150,000	150,000							125,000	125,000	5	273,000	24,730	35
75,000	33,450							75,000	45,000	6	78,450	15,116	36
60,000	50,000										50,000	5,917	37
100,000	32,600							25,000	25,000	7	57,600	13,303	38
40,000	40,000										40,000	5,674	39
300,000	300,000							300,000	225,000	5	525,000	30,347	40
9,250	9,250										9,250	5,968	41
150,000	150,000							150,000	150,000	5	\$300,000	35,294	42
100,000	100,000										100,000	16,000	43
750,000	750,000							750,000	540,000	5	1,290,000	36,857	44
466,667	400,000							466,667	442,667	5	\$842,667	97,081	45
600,000	600,000	2	\$12,000					550,000	522,000	5	1,122,000	64,557	46
350,000	350,000							300,000	300,000	5.6	650,000	28,261	47
200,000	200,000							200,000	200,000	5	400,000	29,564	48
750,000	750,000							750,000	730,000	4.5	1,480,000	62,107	49
150,000	150,000							150,000			150,000	27,273	50
17,301,377	15,245,887			\$2,173,333	\$1,689,141		\$33,974	25,502,637	23,142,477		\$40,077,505	61,976	
5,000	3,460										3,460	3,460	1
44,820	44,820										44,820	10,186	2
600,000	600,000							1,200,000	1,067,000	4	\$1,687,000	55,311	3
1,000,000	1,000,000			1,000,000	1,000,000			1,500,000	1,276,000	4	3,276,000	102,375	4
1,000,000								2,000,000	\$1,100,000		1,100,000	41,822	5
300,000	300,000							\$100,000	\$100,000	5	400,000	16,064	6
5,000,000	4,995,500							10,000,000	9,746,760	4.5	14,742,260	134,191	7
100,000	100,000							400,000	400,000	5	500,000	69,444	8
600,000	600,000							500,000	500,000	5	1,100,000	39,927	9
400,000	400,000							450,000	450,000	5	850,000	47,118	10
4,000,000	4,000,000			1,000,000	632,475	5	31,624	5,000,000	4,972,000	5.6	9,604,475	67,202	11
285,000	150,000							300,000	\$184,080		334,080	17,583	12
50,000	16,000							25,000		6	16,000	8,939	13
56,000	56,000							70,000	70,000	5	\$126,000	11,721	14
410,000	260,050			40,000	40,000	6	2,350	225,000	225,000	6	525,050	35,815	15
100,000	100,000							275,000	125,000	5	225,000	36,526	16
								\$111,994	\$111,994		111,994	18,666	17
75,000	75,000							125,000		5	\$75,000	18,750	18
66,667	66,667			33,333	16,666			100,000	25,000	6	\$108,333	62,589	19
25,000	24,500							75,000	49,000	5	78,500	36,750	20
200,000				100,000				\$95,643	\$95,643		95,643	15,654	21
600,000	400,000										400,000	13,115	22
1,000,000	1,000,000							1,000,000	900,000	5	1,900,000	38,974	23
1,000,000	1,000,000							1,500,000	1,400,000	5	\$2,400,000	63,009	24
15,050	15,050							100,000	50,000	6	65,050	8,131	25
350,000	20,000							350,000	275,000	5	296,000	14,861	26
18,840	18,840										18,840	4,770	27
10,089,700	9,591,200		107,660	950,000	950,000		10,000	10,030,000	6,770,333		17,311,533	104,561	
200,000	96,000							125,000	75,000	6	\$170,000	26,154	1
600,000	625,000							750,000	625,000	5	\$1,225,000	84,483	2
400,000	316,000	4	14,220					250,000	165,000	5	481,000	34,880	3
12,000	12,000	20	2,400								12,000	7,407	4
500,000	500,000							225,000	156,000	6	666,000	76,995	5
1,500,000	1,500,000		10,000					750,000	650,000	5.6	\$2,150,000	66,358	6
1,200,000	1,200,000	6	72,000					2,000,000	800,000	5.6	2,000,000	39,683	7
1,055,000	1,055,000			250,000	250,000			3,000,000	1,718,000	5.6	3,023,000	47,704	8
508,700	508,700							475,000	475,000	5	983,700	40,716	9
500,000	500,000			500,000	500,000						\$1,000,000	47,962	10
125,000	125,000							75,000	75,000	6	\$200,000	133,333	11
100,000	100,000	24	2,500					25,000	17,000	5	117,000	29,250	12
25,000	25,000										25,000	7,358	13

* Floating debt; bonds not yet issued.

* Exclusive of 36.90 miles lying outside of state. Total owned by companies in state, 378.25 miles; total operated, 386.90 miles.

* Exclusive of \$47,704, investments other than street railways and electric-light plants owned.

* Includes 4.40 miles in Nebraska.

* Includes 31.00 miles in Illinois.

* Includes electric-light plant and other investments.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
IOWA—Continued.								
14	Keokuk	Keokuk Electric Railway and Power Co.	Jan. 1, 1902	Dec. 31, 1902	6.50	6.50	\$400,000	\$400,000
15	Marshalltown	Marshalltown Light, Power and Rwy. Co.	July 1, 1901	June 30, 1902	3.60	3.60	334,000	167,000
16	Mason City, Clear Lake	Mason City and Clear Lake Traction Co.	Aug. 1, 1901	July 31, 1902	17.34	17.34	200,000	200,000
17	Muscatine	Citizens Railway and Light Co.	July 1, 1901	June 30, 1902	8.60	8.60	200,000	200,000
18	Ottumwa	Ottumwa Traction and Light Co.	Oct. 1, 1901	Sept. 30, 1902	10.00	10.00	500,000	500,000
19	Red Oak	Red Oak Street Rwy. Co.	May 27, 1901	May 26, 1902	1.20	1.20	50,000	7,500
20	Sioux City; South Sioux City (Nebr.)	Sioux City Traction Co.	June 1, 1901	May 31, 1902	* 43.00	* 43.00	1,200,000	1,100,000
21	Tama, Toledo	Tama and Toledo Electric Railway and Light Co.	Feb. 1, 1901	Jan. 31, 1902	3.00	3.00	80,000	80,000
22	Waterloo, Cedar Falls	Waterloo and Cedar Falls Rapid Transit Co.	Jan. 1, 1901	Dec. 31, 1901	40.00	40.00	600,000	600,000
KANSAS.								
Total for state					* 195.81	* 195.81	6,027,000	5,912,000
1	Arkansas City	Arkansas City Street Rwy. Co.	July 1, 1901	June 30, 1902	5.50	5.50	100,000	50,000
2	Atchison	Atchison Railway, Light and Power Co.	July 1, 1901	June 30, 1902	9.00	9.00	100,000	100,000
3	Fort Scott	Fort Scott Consolidated Supply Co.—Street Railway Department.	July 1, 1901	June 30, 1902	9.00	9.00	75,000	75,000
4	Hutchinson	Hutchinson Street Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	7.83	7.83	100,000	45,000
5	Iola, LaHarpe	Iola Electric R. R. Co.	Dec. 27, 1901	Dec. 26, 1902	8.25	8.25	150,000	150,000
6	Junction City, Fort Riley	Electric Railway and Ice Co.	July 1, 1901	June 30, 1902	4.50	4.50	50,000	40,000
7	Leavenworth	Kansas City—Leavenworth R. R. Co. ⁵			39.00	39.00	8,750,000	3,750,000
8	Pittsburg, Frontenac	Pittsburg R. R. Co.	July 1, 1901	June 30, 1902	11.75	11.75	125,000	125,000
9	Strong, Cottonwood Falls	The Consolidated Street Rwy. Co.	July 1, 1901	June 30, 1902	2.05	2.05	10,000	10,000
10	Topeka	Topeka Rwy. Co.	July 1, 1901	June 30, 1902	28.63	28.63	1,250,000	1,250,000
11	Wichita	Wichita Railroad and Light Co.	July 1, 1901	June 30, 1902	18.50	18.50	300,000	300,000
12	Winfield	Union Street Rwy. Co.	July 1, 1901	June 30, 1902	6.25	6.25	* 17,000	* 17,000
KENTUCKY.								
Total for state					* 284.35	* 296.76	12,355,000	11,330,900
1	Bowling Green	Bowling Green Rwy. Co.	Sept. 16, 1901	Sept. 15, 1902	4.00	4.00	20,000	20,000
2	Covington, Newport; Cincinnati (Ohio)	Cincinnati, Newport and Covington Rwy. Co. (South Covington and Cincinnati Street Rwy. Co.)	Jan. 1, 1901	Dec. 31, 1901	* 50.00	* 56.00	4,500,000	3,500,000
3	Frankfort	Frankfort and Suburban Rwy. Co.	July 1, 1901	June 30, 1902	7.26	7.26	10,000	5,000
4	Henderson	Henderson Street Rwy. Co.	July 1, 1901	June 30, 1902	5.50	5.50	50,000	50,000
5	Lexington	Lexington Rwy. Co.	May 1, 1901	Apr. 30, 1902	15.13	15.13	800,000	800,000
6	Lexington, Georgetown	Georgetown and Lexington Traction Co.	June 1, 1902	July 17, 1902	12.08	13.08	250,000	250,000
7	Louisville	Louisville Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	142.00	142.00	6,000,000	6,000,000
8	Louisville, Anchorage	Louisville, Anchorage and Pewee Valley Electric Rwy. Co.	Dec. 1, 1901	Nov. 30, 1902	14.10	18.60	350,000	350,000
9	Louisville; New Albany (Ind.)	Kentucky and Indiana Bridge and R. R. Co.	July 1, 1901	June 30, 1902	115.13	116.04	75,000	75,000
10	Maysville	Maysville Street Railroad and Transfer Co.	July 1, 1901	June 30, 1902	4.25	4.25	50,000	30,000
11	Owensboro	Owensboro City R. R. Co.	Jan. 1, 1902	June 30, 1902	8.50	8.50	50,000	50,000
12	Paducah	Paducah City Rwy. Co.	July 1, 1901	June 30, 1902	16.00	16.00	200,000	200,000
LOUISIANA.								
Total for state					198.52	198.84	12,569,700	12,484,900
1	Baton Rouge	Baton Rouge Electric and Gas Co.	July 1, 1901	June 30, 1902	3.75	3.75	50,000	50,000
2	Lake Charles	Lake Charles Street Rwy. Co.	July 1, 1901	June 30, 1902	2.11	2.11	50,000	11,000
3	New Orleans	St. Charles Street R. R. Co.	July 1, 1901	June 30, 1902	18.57	18.57	1,000,000	953,340
4	do	Orleans R. R. Co.	July 1, 1901	June 30, 1902	11.21	11.53	234,700	234,700
5	do	New Orleans Rwy. Co. ¹²	July 1, 1901	June 30, 1902	115.00	115.00	7,500,000	7,500,000
6	do	New Orleans and Carrollton Railroad, Light and Power Co. ¹³	July 1, 1901	June 30, 1902	35.53	35.53	3,500,000	3,500,000
7	New Orleans, Gretna	Algiers, McDonoghville and Gretna R. R. Co.	July 1, 1901	June 30, 1902	3.55	3.55	35,000	35,000
8	Shreveport	Shreveport Belt Rwy. Co. (Shreveport Traction Co.)	July 1, 1901	June 30, 1902	8.80	8.80	200,000	200,000
MAINE.								
Total for state					14 328.50	14 330.40	6,444,300	5,033,055
1	Augusta, Winthrop, Gardiner	Augusta, Winthrop and Gardiner Rwy. Co.	July 1, 1901	June 30, 1902	13.11	13.11	150,000	120,000
2	Bangor, Brewer	Public Works Co.—Street Railway and Lighting Department.	July 1, 1901	June 30, 1902	10.80	10.80	600,000	548,989
3	Bangor, Corinth, Glenburn	Penobscot Central Rwy. Co.	July 1, 1901	June 30, 1902	27.31	27.59	250,000	250,000
4	Bangor, Orono, Old Town	Bangor, Orono and Old Town Rwy. Co.	July 1, 1901	June 30, 1902	16.70	16.70	125,000	125,000
5	Bangor, Hampden	Bangor, Hampden and Winterport Rwy. Co.	July 1, 1901	June 30, 1902	5.40	7.02	500,000	60,000
6	Biddeford, Saco, Old Orchard	Biddeford and Saco R. R. Co.	July 1, 1901	June 30, 1902	8.15	8.15	100,000	50,000
7	Calais, Milltown; St. Stephens (N. B., Canada)	Calais Street Rwy. Co.	July 1, 1901	June 30, 1902	17 7.10	17 7.10	100,000	100,000

¹ Includes electric-light plant.² Includes 1.50 miles in Nebraska.³ Includes investments other than street railways.⁴ Includes 45.55 miles in state owned by outside companies. Total owned and operated by companies in state, 150.26 miles.⁵ This company failed to make a report; the information given was obtained from street-railway journals and directories.⁶ Cash investment.⁷ Exclusive of 6.47 miles lying outside of state, but including 6.87 miles in state owned by outside companies. Total owned by companies in state, 283.95 miles; total operated, 296.36 miles.⁸ Includes electric-light plants and other investments.⁹ Includes 6 miles in Ohio.

GENERAL TABLES.

245

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$400,000	\$400,000							\$250,000	\$250,000	5	1 \$650,000	\$100,000	14
334,000	167,000	2	\$3,340					100,000	93,333	6	1 260,333	72,315	15
200,000	200,000							100,000	91,000	6	291,000	16,782	16
200,000	200,000							135,000	135,000	5	335,000	38,953	17
300,000	300,000			\$200,000	\$200,000	5	\$10,000	300,000	300,000	5	1 800,000	80,000	18
50,000	7,500										7,500	6,250	19
1,200,000	1,100,000							750,000	750,000	5	2 1,850,000	43,023	20
80,000	80,000	4	3,200					20,000	20,000	6	1 100,000	33,333	21
600,000	600,000							700,000	375,000	5.6	975,000	24,375	22
6,027,000	5,912,000		4,000					3,375,000	1,115,000		17,027,000	46,766	
100,000	50,000										50,000	9,091	1
100,000	100,000	4	4,000					50,000	50,000	6	150,000	16,667	2
75,000	75,000							60,000	50,000	5	125,000	13,889	3
100,000	45,000							100,000			45,000	5,747	4
150,000	150,000							150,000	150,000	6	300,000	36,364	5
50,000	40,000							40,000	40,000	5	80,000	17,778	6
3,750,000	3,750,000							2,000,000			3,750,000	96,154	7
125,000	125,000							125,000	125,000	5	1,250,000	21,277	8
10,000	10,000										10,000	4,878	9
1,250,000	1,250,000							600,000	450,000	4 1/2	1,700,000	59,378	10
300,000	300,000							250,000	250,000	5	1,550,000	29,730	11
17,000	17,000										17,000	2,720	12
9,855,000	8,830,900		246,000	2,500,000	2,500,000		125,000	14,930,000	12,204,300		23,535,200	82,885	
20,000	20,000							20,000	20,000	5	40,000	10,000	1
4,500,000	3,600,000	3	109,000					4,000,000	3,600,000	5.6	7,100,000	142,000	2
10,000	5,000							30,000	30,000	6	35,000	4,821	3
50,000	50,000							60,000	60,000	6	110,000	20,000	4
800,000	800,000	2	16,000					1,500,000	875,000	5.6	1,675,000	110,707	5
250,000	250,000							250,000	200,000	5	450,000	37,252	6
3,500,000	3,500,000	4	140,000	2,500,000	2,500,000	5	125,000	5,000,000	6,349,300	4 1/2, 5.6	12,349,300	86,967	7
350,000	350,000							500,000	500,000	5	850,000	60,254	8
75,000	75,000							50,000	50,000	4	125,000	24,366	9
50,000	30,900							20,000	20,000	6	50,900	11,976	10
50,000	50,000							100,000	100,000	6	150,000	17,647	11
200,000	200,000							400,000	400,000	6	1,600,000	37,500	12
7,469,700	7,384,900		107,198	5,100,000	5,100,000		255,000	10,929,000	10,010,000		122,494,900	113,313	
50,000	50,000							45,000	41,000	5	1 91,000	24,267	1
50,000	11,900										11,900	5,640	2
1,000,000	953,300	6	57,198					600,000	300,000	4	1,253,300	67,491	3
234,700	234,700							400,000	400,000	6	634,700	56,619	4
5,000,000	5,000,000	1	50,000	2,600,000	2,500,000	5	125,000	6,600,000	6,520,000	4.5, 6	14,020,000	121,913	5
900,000	900,000			2,600,000	2,600,000	5	130,000	3,254,000	2,749,000	5.6	6,249,000	175,880	6
35,000	35,000										35,000	9,859	7
200,000	200,000										200,000	22,727	8
6,444,300	5,053,055		67,829					7,213,000	6,155,000		11,208,055	12,32,116	
150,000	120,000	2	2,400					250,000	250,000	4.6	370,000	28,223	1
600,000	548,989							600,000	596,000	5	1,144,989	147,601	2
250,000	250,000							250,000	250,000	5	500,000	18,308	3
125,000	125,000							125,000	125,000	6	250,000	14,970	4
500,000	60,000							40,000	40,000	5	100,000	18,519	5
100,000	50,000							150,000	150,000	4	200,000	24,540	6
100,000	100,000							100,000	100,000	5	200,000	28,169	7

¹ Dividend on \$3,000,000 only.² Includes .47 mile in Indiana.³ This is a combined report of the New Orleans City Railroad Company for 9 months, and the New Orleans Railways Company for 3 months.⁴ This is a combined report of the New Orleans and Carrollton Railroad Company for 6 months, and the New Orleans and Carrollton Railroad, Light and Power Company for 6 months.⁵ Exclusive of 3.05 miles lying outside of state. Total owned by companies in state, 331.55 miles; total operated, 333.45 miles.⁶ Exclusive of \$559,960, investments other than street railways and electric-light plants owned.⁷ Exclusive of \$285,300, investments other than street railways and electric-light plants owned.⁸ Includes 3.05 miles in New Brunswick, Canada.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
MAINE—Continued.								
8	Fairfield, Benton.....	Benton and Fairfield Rwy. Co.....	July 1, 1901	June 30, 1902	4.37	4.37	\$20,000	\$20,000
9	Fryeburg.....	Fryeburg Horse R. R. Co.....	July 1, 1901	June 30, 1902	3.00	3.00	6,000	5,175
10	Kennebunkport.....	Atlantic Shore Line Rwy. Co.....	July 1, 1901	June 30, 1902	1.58	1.58	500,000	30,000
11	Lewiston, Bath, Brunswick.....	Lewiston, Brunswick and Bath Street Rwy. Co.....	July 1, 1901	June 30, 1902	56.18	56.18	638,300	627,100
12	Norway, South Paris.....	Norway and Paris Street Rwy. Co.....	July 1, 1901	June 30, 1902	2.14	2.14	25,000	25,000
13	Portland.....	Portland R. R. Co. ¹	July 1, 1901	June 30, 1902	89.63	89.63	2,000,000	1,999,591
14	Portsmouth (N. H.), Kittery, York.....	Portsmouth, Kittery and York Street Rwy. Co.....	July 1, 1901	June 30, 1902	15.70	15.70	230,000	221,400
15	Rockland, Thomaston, Camden, Rockport.....	Rockland, Thomaston and Camden Street Rwy. Co.....	July 1, 1901	June 30, 1902	21.64	21.64	300,000	250,000
16	Sanford, Kennebunk.....	Sanford and Cape Porpoise Rwy. Co.....	July 1, 1901	June 30, 1902	21.92	25.39	250,000	249,000
16a	Cape Porpoise.....	Mousam River R. R. Co. (lessor).....	July 1, 1901	June 30, 1902	3.47	.....	200,000	91,800
17	Skowhegan, Norridgewock.....	Skowhegan and Norridgewock Railway and Power Co.....	July 1, 1901	June 30, 1902	5.85	5.85	50,000	50,000
18	Skowhegan, Madison.....	Somerset Traction Co.....	July 1, 1901	June 30, 1902	12.68	12.68	200,000	30,000
19	Waterville, Fairfield.....	Waterville and Fairfield Railway and Light Co.....	July 1, 1901	June 30, 1902	4.82	4.82	200,000	200,000
MARYLAND.								
Total for state.....					\$ 455.44	\$ 456.63	39,855,000	16,036,006
1	Baltimore, Emory Grove, Brooklyn, Ellicott City.....	United Railways and Electric Co.....	Jan. 1, 1901	Dec. 31, 1901	365.12	365.12	38,000,000	15,073,306
2	Cumberland.....	Cumberland Electric Rwy. Co.....	July 1, 1901	June 30, 1902	7.07	7.07	100,000	100,000
3	Frederick, Middletown, Myersville.....	Frederick and Middletown Rwy. Co.....	July 1, 1901	June 30, 1902	8.76	14.68	100,000	43,500
3a	.....	Frederick City Suburban Rwy. Co. (lessor).....	July 1, 1901	June 30, 1902	.81	.....	5,000	4,200
3b	.....	Myersville and Catoclin Rwy. Co. (lessor).....	July 1, 1901	June 30, 1902	5.11	.....	50,000	22,000
4	Chevy Chase, Kensington.....	Kensington Rwy. Co.....	Sept. 13, 1902	Jan. 8, 1903	2.53	2.53	25,000	18,000
5	Frostburg and vicinity.....	Cumberland and Westernport Electric Rwy. Co.....	Apr. 24, 1902	June 30, 1902	8.72	8.72	1,000,000	200,000
6	Hagerstown, Williamsport, Funkstown.....	Hagerstown Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	13.70	13.70	200,000	200,000
7	Washington (D. C.), Takoma.....	Baltimore and Washington Transit Co.....	Jan. 1, 1902	Dec. 31, 1902	2.00	2.00	100,000	100,000
8	Washington (D. C.), Glen Echo.....	Washington and Glen Echo R. R. Co.....	Jan. 1, 1901	Dec. 31, 1901	10.40	11.59	200,000	200,000
9	Washington (D. C.), Halpin, Rockville.....	Washington and Rockville Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	10.90	10.90	50,000	50,000
10	Washington (D. C.), Woodside, Forest Glen.....	Washington, Woodside and Forest Glen Railway and Power Co.....	Jan. 1, 1901	Dec. 31, 1901	2.72	2.72	25,000	25,000
MASSACHUSETTS.								
Total for state.....					\$2,507.58	\$2,578.42	70,115,000	59,378,602
Amesbury; Hampton (N. H.)....								
Amesbury and Hampton Street Rwy. Co. See Exeter, Hampton and Amesbury Rwy. Co. of Exeter, N. H.								
1	Amherst, Sunderland.....	Amherst and Sunderland Street Rwy. Co..	Oct. 1, 1901	Sept. 30, 1902	14.87	14.87	98,000	93,000
2	Attleboro, North Attleboro, Wrentham; Pawtucket (R. I.).....	Interstate Consolidated Street Rwy. Co....	Jan. 1, 1901	Dec. 31, 1901	27.64	27.64	380,000	380,000
3	Boston, Arlington, Concord, Newton, Waltham, Watertown, Woburn.....	Lexington and Boston Street Rwy. Co.....	Oct. 1, 1901	Sept. 30, 1902	30.78	37.04	525,000	525,000
3a	.....	Concord and Boston Street Rwy. Co. (lessor).....	Sept. 30, 1901	Oct. 19, 1901	2.43	.....	50,000	50,000
4	Boston, Brockton, Quincy, Taunton, Fall River; Providence (R. I.).....	Old Colony Street Rwy. Co.....	Oct. 1, 1901	Sept. 30, 1902	359.58	379.26	5,781,000	5,777,700
4a	.....	Newport and Fall River Street Rwy. Co. (lessor).....	July 1, 1901	June 30, 1902	19.73	.....	750,000	750,000
5	Boston, Andover, Chelsea, Everett, Gloucester, Haverhill, Lawrence, Lynn, Malden, Marblehead, Peabody, Reading, Salem, Woburn; Nashua (N. H.).....	Boston and Northern Street Rwy. Co.....	Oct. 1, 1901	Sept. 30, 1902	383.20	440.38	6,523,000	6,143,000
5a	.....	East Middlesex Street Rwy. Co. (lessor).....	Oct. 1, 1901	Sept. 30, 1902	19.39	.....	300,000	297,700
5b	.....	Boston and Chelsea R. R. Co. (lessor).....	Oct. 1, 1901	Sept. 30, 1902	4.15	.....	800,000	121,000
5c	.....	Winnisimmet R. R. Co. (lessor).....	Oct. 1, 1901	Sept. 30, 1902	2.19	.....	75,000	50,000
5d	.....	Boston and Revere Electric Street Rwy. Co. (lessor).....	Oct. 1, 1901	Sept. 30, 1902	3.85	.....	50,000	50,000
5e	.....	Gloucester and Rockport Street Rwy. Co. (lessor).....	Oct. 1, 1901	Sept. 30, 1902	1.57	.....	30,000	30,000
5f	.....	Nashua Street Rwy. Co. (lessor).....	July 1, 1901	June 30, 1902	15.52	.....	325,000	300,000
6	Boston, Cambridge, Chelsea, Everett, Malden, Medford, Newton, Somerville, Brookline, Watertown.....	Boston Elevated Rwy. Co.....	Oct. 1, 1901	Sept. 30, 1902	20.58	404.94	20,000,000	12,843,310
6a	.....	West End Street Rwy. Co. (lessor).....	Oct. 1, 1901	Sept. 30, 1902	374.59	.....	16,400,000	15,485,000

¹ Includes Portland and Yarmouth Elec. Rwy. Co., Portland and Cape Elizabeth Elec. Rwy. Co., and Westbrook, Windham and Naples Elec. Rwy. Co.

² Includes investments other than street railways.

³ Includes electric-light plant.

⁴ Exclusive of \$268,530. investments other than street railways and electric-light plants owned.

⁵ Exclusive of 1.80 miles lying outside of state, but including 19.40 miles in state owned by outside companies. Total owned by companies in state, 437.84 miles: total operated, 439.03 miles.

⁶ Exclusive of \$30,000. investments other than street railways and electric-light plants owned.

⁷ Includes .50 mile in District of Columbia.

⁸ Includes 1.30 miles in District of Columbia.

⁹ Exclusive of 41.26 miles lying outside of state, but including 23.19 miles in state owned by outside companies. Total owned by companies in state, 2,525.65 miles; total operated, 2,596.49 miles.

GENERAL TABLES.

247

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$20,000	\$20,000										\$20,000	\$4,577	8
6,000	5,175										5,175	1,725	9
500,000	90,000										30,000	18,987	10
638,300	627,100							\$1,000,000	\$1,000,000	5	1,627,100	28,982	11
25,000	25,000							18,000	18,000	5	43,000	20,098	12
2,000,000	1,999,591	11, 3	\$59,898					3,000,000	1,950,000	3½ to 5	\$3,949,591	44,066	13
230,000	221,400	2½	5,531					200,000	200,000	6	421,400	26,841	14
300,000	250,000							500,000	500,000	4 to 6	\$1,050,000	\$26,111	15
250,000	249,000							250,000	246,000	5	495,000	22,582	16
200,000	91,800							65,000	65,000	6	156,800	45,187	16a
50,000	50,000							50,000	50,000	6	100,000	17,094	17
200,000	30,000							75,000	75,000	5	\$105,000	8,281	18
200,000	200,000							240,000	240,000	5, 6	\$440,000	91,286	19
25,855,000	15,962,700		4,420	\$14,000,000	\$73,306			53,480,000	52,359,194		68,395,200	\$156,142	
24,000,000	15,000,000			14,000,000	73,306			52,000,000	51,381,694	4, 4½, 5, 6	66,455,000	182,009	1
100,000	100,000	4	4,000					75,000	75,000	5	175,000	\$20,509	2
100,000	43,500							70,000	70,000	5	113,500	12,957	3
5,000	4,200	10	420								4,200	5,185	3a
50,000	22,000							35,000	35,000	5	57,000	11,155	3b
25,000	18,000							15,000	12,500	6	30,500	12,055	4
1,000,000	200,000							250,000	200,000	5	400,000	45,872	5
200,000	200,000							200,000	200,000	6	\$400,000	29,197	6
100,000	100,000							500,000	50,000	5	150,000	75,000	7
200,000	200,000							250,000	250,000	6	450,000	43,269	8
50,000	50,000							45,000	45,000	5	95,000	8,716	9
25,000	25,000							40,000	40,000	6	65,000	23,897	10
63,715,000	52,978,602		2,670,455	6,400,000	6,400,000		\$512,000	40,828,000	37,966,942		\$97,345,544	\$139,067	
93,000	93,000	4	\$12,020					51,500	51,500	5	144,500	9,718	1
380,000	380,000							150,000	150,000	4	\$150,000	19,175	2
525,000	525,000	3½	\$15,068					350,000	350,000	4½	875,000	28,428	3
50,000	50,000										50,000	20,576	3a
5,781,000	5,777,700	5	288,885					5,950,000	4,669,000	4½, 5, 6	10,446,700	29,057	4
750,000	750,000	6	\$139,210					650,000	543,500	5, 6	\$1,293,500	65,560	4a
6,523,000	6,143,000	6	\$1267,380					9,839,500	8,444,500	5, 6	14,567,500	38,068	5
300,000	297,700	10	29,770					220,000	220,000	4, 5	517,700	26,699	5a
300,000	121,000	6	7,260								121,000	29,157	5b
75,000	50,000	6	3,000								50,000	22,831	5c
50,000	50,000	5	2,500					50,000	34,000	5	84,000	21,818	5d
30,000	30,000	6	1,800								30,000	19,106	5e
325,000	300,000	5	15,000					150,000	150,000	4	450,000	28,995	5f
20,000,000	12,383,310	6	\$12600,000								12,383,310	\$1591,414	6
10,000,000	9,065,000	7	635,950	6,400,000	6,400,000	8	512,000	14,666,000	14,666,000	4, 4½, 5	30,151,000	80,491	6a

¹ Capital reported for 92 companies only, representing 2,486.32 miles of track owned. (See note 3, page 46.) In addition to capital stock and funded debt these companies have bills payable amounting to \$16,241,821; total of capital liabilities and bills payable, \$113,375,354, or \$45,600 per mile of track owned. (See note 14: note 1, page 248; and note 2, page 250.)

² Exclusive of \$212,011, investments other than street railways and electric-light plants owned.

³ Part of capital stock issued during the year reported.

⁴ Includes 6.01 miles in Rhode Island.

⁵ This company has also a large floating debt.

⁶ Includes 19.73 miles in Rhode Island.

⁷ Includes 15.52 miles in New Hampshire.

⁸ Includes 16.02 miles elevated.

STREET AND ELECTRIC RAILWAYS.

TABLE 98.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
MASSACHUSETTS—Continued.								
6b		Somerville Horse R. R. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	8.08		\$153,000	\$153,000
7	Woburn, Billerica	Lowell and Boston Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	9.64	9.78	90,000	90,000
8	Braintree, Weymouth, Hingham, Hull, Cohasset	New York, New Haven and Hartford R. R. Co. (Nantasket System). ²	July 1, 1901	June 30, 1902	39.33	39.33	(³)	(²)
9	Canton, Stoughton	Blue Hill Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	11.30	11.30	150,000	150,000
10	Cheshire, Adams, North Adams, Williamstown	Hoosac Valley Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	18.70	18.70	200,000	200,000
11	Concord, Maynard, Hudson	Concord, Maynard and Hudson Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	13.07	13.42	175,000	175,000
12	Conway, Deerfield	Conway Electric Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	6.35	6.35	100,000	35,950
13	Cottage City	Cottage City and Edgartown Traction Co.	June 17, 1902	Sept. 10, 1902	5.47	5.47	60,000	60,000
14	Dedham, Medfield	Norfolk Western Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	9.45	9.45	100,000	100,000
15	Deerfield, Greenfield	Greenfield and Deerfield Street Rwy. Co.	Dec. 7, 1901	Sept. 30, 1902	7.90	7.90	100,000	61,700
16	Rehoboth, Swansea, Seekonk	Providence and Fall River Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	12.53	12.53	165,000	165,000
17	Fall River, Westport, New Bedford, Dartmouth	Dartmouth and Westport Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	9.84	19.98	150,000	150,000
18	Fitchburg, Leominster, Lunenburg	Fitchburg and Leominster Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	31.68	31.68	500,000	350,000
19	Framingham	Framingham Union Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	6.84	6.98	60,000	30,000
20	Gardner, Westminster, Fitchburg	Gardner, Westminster and Fitchburg Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	16.05	16.05	185,000	185,000
21	Greenfield, Montague	Greenfield and Turners Falls Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	15.07	15.07	130,000	115,500
22	Haverhill	Haverhill and Southern New Hampshire Street Rwy. Co.	July 1, 1902	Sept. 30, 1902	6.06	6.06	60,000	30,000
23	Haverhill, Groveland, Georgetown	Haverhill, Georgetown and Danvers Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	6.02	6.54	60,000	60,000
24	Haverhill, Merrimac, Amesbury, Salisbury, Newburyport	Haverhill and Amesbury Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	28.46	29.51	150,000	150,000
25	Holyoke, Chicopee, Northampton, South Hadley	Holyoke Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	42.70	43.70	700,000	700,000
25a		Mt. Tom R. R. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	1.00		100,000	100,000
26	Lawrence, Andover, North Reading, Reading	Lawrence and Reading Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	11.98	12.90	222,000	222,000
27	Lawrence, Methuen	Lawrence and Methuen Street Rwy. Co.	Aug. 21, 1902	Sept. 30, 1902	6.46	6.69	70,000	35,000
28	Lawrence, Middleton, Danvers, Peabody, Salem	Middleton and Danvers Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	13.80	24.28	32,000	32,000
29	Mansfield, Foxboro, Wrentham, Walpole, Norwood	Norfolk and Bristol Street Rwy. Co.	Nov. 15, 1901 ⁴	Sept. 30, 1902	21.05	21.05	200,000	200,000
30	Marlboro, Hudson, Framingham	Marlboro Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	8.11	15.80	80,000	80,000
30a		Framingham, Southboro and Marlboro Street Rwy. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	7.69		80,000	80,000
31	Marlboro, Westboro, North Grafton	Marlboro and Westboro Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	13.86	13.86	160,000	160,000
32	Medfield, Medway, Franklin	Medfield and Medway Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	11.25	11.25	100,000	100,000
33	Middleboro, Rochester, Wareham	Middleboro, Wareham and Buzzards Bay Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	22.22	29.74	150,000	150,000
34	Milford, Franklin, Wrentham	Milford, Attleboro and Woonsocket Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	30.52	30.71	315,000	315,000
35	Milford, Uxbridge, South Framingham, Medway, Bellingham	Milford and Uxbridge Street Rwy. Co. (including Milford, Holliston and Framingham Street Rwy. Co.)	Oct. 1, 1901	Sept. 30, 1902	36.00	36.02	353,500	352,000
36	Natick, Wellesley, Needham, Wayland, Framingham	Natick and Cochituate Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	18.80	18.80	100,000	100,000
37	Needham, Natick, Framingham	South Middlesex Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	13.85	19.67	100,000	100,000
37a		Natick and Needham Street Rwy. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	5.82		50,000	50,000
38	New Bedford, Fairhaven, Dartmouth	Union Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	30.44	30.64	600,000	600,000
39	Mattapoisett, Marion, Wareham	New Bedford and Onset Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	21.86	21.86	500,000	500,000
40	Newburyport, Amesbury, Merrimac, Newbury	Citizens Electric Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	23.08	23.65	240,000	240,000
41	Newburyport, Byfield, Ipswich, Georgetown	Georgetown, Rowley and Ipswich Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	18.18	18.79	180,000	180,000
42	Newton	Commonwealth Avenue Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	13.37	13.92	292,000	292,000
43	do	Wellesley and Boston Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	4.90	8.66	115,000	115,000
44	Newton, Needham, Watertown	Newton and Boston Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	9.79	15.22	200,000	200,000
44a		Newtonville and Watertown Street Rwy. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	*4.66		100,000	50,000
45	Newton, Waltham, Watertown	Newton Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	15.76	19.36	315,000	315,000
46	Northampton, Easthampton, Williamsburg	Northampton Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	26.26	26.26	300,000	300,000
47	Northampton, Hatfield, Hadley, Amherst	Northampton and Amherst Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	14.84	14.84	180,000	180,000
48	North Andover	Haverhill and Andover Street Rwy. Co.	July 1, 1902	Sept. 30, 1902	1.80	1.80	80,000	80,000
49	Norton, Attleboro, Mansfield, Easton, Taunton	Norton and Taunton Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	29.83	30.24	297,000	297,000
50	Orange, Athol	Athol and Orange Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	7.32	7.32	74,500	74,500
51	Pittsfield, Lanesboro, Cheshire, Dalton	Pittsfield Electric Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	21.18	21.18	200,000	200,000
52	Plymouth	Plymouth and Sandwich Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	6.36	6.36	60,000	36,800
53	Plymouth, Kingston, Pembroke, Whitman	Brockton and Plymouth Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	23.80	23.80	295,000	295,000
54	Sharon, Norwood	Norwood, Canton and Sharon Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	6.15	6.15	125,000	62,500
55	Shelburne, Coleraine	Shelburne Falls and Coleraine Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	7.01	7.01	50,000	50,000
56	Southbridge, Sturbridge	Southbridge and Sturbridge Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	8.01	8.01	60,000	60,000

¹ This company has also a large floating debt.² Primarily a steam road. Operates an electric road during summer season only.³ Capitalization included in that of steam road.⁴ Formerly the Norfolk and Southern; reorganized on this date. Report for earlier operations not available.

GENERAL TABLES.

249

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$153,000 90,000	\$153,000 90,000	6	\$9,180					\$90,000 (2)	\$90,000 (2)	4½	\$153,000 180,000	\$19,054 18,672	6b 7 8
150,000 200,000	150,000 200,000	6	12,000					100,000	100,000	5	150,000 300,000	13,274 16,043	9 10
175,000	175,000							165,000	165,000	5	340,000	26,014	11
100,000 60,000	35,950 60,000										35,950 60,000	5,661 10,969	12 13
100,000 100,000	100,000 61,700							100,000	100,000	5	200,000 61,700	21,164 7,810	14 15
165,000 150,000	165,000 150,000	8	12,000					165,000 90,000	165,000 90,000	5 5	330,000 240,000	26,337 24,390	16 17
500,000	350,000	6	21,000					300,000	300,000	4½, 5	1650,000	20,518	18
60,000 185,000	30,000 185,000	5	1,500					47,000 150,000	47,000 150,000	5 5	177,000 335,000	11,257 20,872	19 20
130,000	115,500	4	4,620					100,000	88,000	5	203,500	13,504	21
60,000	30,000										130,000	4,950	22
60,000	60,000							35,000	35,000	5	95,000	15,781	23
150,000	150,000							490,000	490,000	5, 6	640,000	22,488	24
700,000	700,000	8	56,000					335,000	335,000	5	11,035,000	24,239	25
100,000 222,000	100,000 222,000	6	6,000								100,000 1222,000	100,000 18,581	25a 26
70,000 32,000	35,000 32,000										135,000 132,000	5,418 2,819	27 28
200,000	200,000										1200,000	9,501	29
80,000 80,000	80,000 80,000							80,000 60,000	67,000 60,000	6 5	1147,000 140,000	18,126 18,205	30 30a
160,000	160,000							160,000	160,000	5	320,000	23,068	31
100,000 150,000	100,000 150,000							100,000 150,000	100,000 150,000	5 5	200,000 1300,000	17,778 18,501	32 33
315,000	315,000	4	10,000					250,000	250,000	5	565,000	18,512	34
353,500	352,000	6	15,120					215,000	215,000	5	1567,000	15,750	35
100,000	100,000	8	8,000								1100,000	5,319	36
100,000 50,000	100,000 50,000	4	2,000					100,000 50,000	100,000 50,000	5 5	1200,000 100,000	14,440 17,182	37 37a
600,000	600,000	8	48,000					400,000	400,000	5	11,000,000	32,852	38
500,000 240,000	500,000 240,000	7	16,800					280,000 210,000	280,000 210,000	5 5	780,000 450,000	35,682 19,497	39 40
180,000	180,000							180,000	180,000	5	360,000	19,802	41
292,000 115,000	292,000 115,000	4½ 8	13,140 9,200					75,000	75,000	5	367,000 115,000	27,450 23,469	42 43
200,000 100,000	200,000 50,000	7½	3,600					200,000	200,000	5	1400,000 150,000	40,858 10,730	44 44a
315,000 300,000	315,000 300,000	6 8	18,900 24,000					250,000 225,000	250,000 225,000	5 4½, 5	1565,000 1525,000	35,850 19,992	45 46
180,000	180,000							160,000	160,000	5	340,000	22,911	47
80,000 297,000	80,000 297,000							296,000	296,000	5	180,000 593,000	44,444 19,879	48 49
74,500 200,000	74,500 200,000	8 6	5,960 77,800					60,000 55,000	60,000 55,000	5 4½, 5	134,500 255,000	18,374 12,040	50 51
60,000 235,000	36,800 235,000							270,000	270,000	4½, 5	136,800 1565,000	5,786 23,739	52 53
125,000	62,500										162,500	10,163	54
50,000	50,000							50,000	50,000	6	100,000	14,265	55
60,000	60,000							60,000	60,000	5	120,000	14,981	56

a Dividends not declared on full amount of stock shown.

b Part leased to Boston Elevated.

c Dividends declared on \$130,000 only.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
MASSACHUSETTS—Continued.								
57	South Hadley, Granby	Hampshire Street Rwy. Co.	July 12, 1902	Sept. 30, 1902	4.57	4.57	\$100,000	¹ \$67,200
58	Springfield, Chicopee, Longmeadow	Springfield Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	92.03	92.03	1,958,400	1,958,400
59	Palmer, Ware, South Monson	Springfield and Eastern Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	30.46	30.46	370,000	370,000
60	Stoughton, Randolph	Stoughton and Randolph Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	7.76	8.25	110,000	110,000
61	Taunton, Lakeville, Middleboro	East Taunton Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	10.70	11.42	200,000	200,000
62	Taunton, Attleboro	Bristol County Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	16.67	17.36	50,000	50,000
63	Templeton, Gardner, Athol, Phillipston	Templeton Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	10.98	18.39	18,600	18,600
63a	.....	Phillipston Street Rwy. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	7.41	.....	150,000	¹⁸ 742
64	Tisbury	Marthas Vineyard Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	1.10	1.10	20,000	20,000
65	Upton	Upton Street Rwy. Co.	Jan. 1, 1902	June 23, 1902	2.66	2.66	60,000	60,000
66	Wakefield	Reading, Wakefield and Lynnfield Street Rwy. Co.	Aug. 1, 1902	Sept. 30, 1902	3.03	4.11	75,000	75,000
67	Ware, West Brookfield, New Braintree, Hardwick	Hampshire and Worcester Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	12.12	12.12	220,000	150,000
68	Warren, Brookfield, Spencer	Warren, Brookfield and Spencer Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	20.10	20.10	50,000	50,000
69	Webster, Dudley	Webster and Dudley Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	6.09	6.09	250,000	200,000
70	Westfield, West Springfield	Woronoco Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	12.25	12.25	12,000	12,000
71	Whitinsville, Linwood	Linwood Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	.66	1.90	4,345,000	3,550,000
72	Worcester and vicinity	Worcester Consolidated Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	126.39	132.47	20,000	20,000
72a	.....	Worcester and Shrewsbury Street Rwy. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	.46	.....	110,000	110,000
72b	.....	North End Street Rwy. Co. (lessor)	Oct. 1, 1901	Sept. 30, 1902	5.13	.....	60,000	60,000
73	Worcester, Millbury, Sutton, Grafton	Worcester and Blackstone Valley Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	16.36	17.49	500,000	500,000
74	Worcester, Oxford, Charlton, Southbridge	Worcester and Southbridge Street Rwy. Co.	July 21, 1902	Sept. 30, 1902	20.05	26.05	40,000	40,000
74a	.....	Worcester, Rochdale and Charlton Depot Street Rwy. Co. (lessor)	July 21, 1902	Sept. 30, 1902	1.62	.....	150,000	150,000
75	Worcester, Webster	Worcester and Webster Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	15.53	17.90	30,120,000	29,033,100
MICHIGAN.					\$1,048.26	\$1,083.11		
Total for state								
1	Adrian	Adrian Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	4.06	4.06	40,000	40,000
2	Bay City, West Bay City	Bay Cities Consolidated Street Rwy. Co.	Aug. 1, 1901	July 31, 1902	23.30	23.30	1,000,000	950,000
3	Benton Harbor, St. Joseph	Benton Harbor and St. Joseph Electric Railway and Light Co.	Sept. 1, 1901	Aug. 31, 1902	10.50	10.50	145,000	145,000
4	Detroit, Flint, Pontiac, Wyandotte, and vicinity	Detroit United Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	381.30	381.30	12,500,000	12,500,000
5	Detroit, Mt. Clemens, St. Clair, Port Huron	Detroit and Port Huron Shore Line Rwy. Co.	July 1, 1901	June 30, 1902	107.37	132.37	2,000,000	2,000,000
6	Detroit, Ypsilanti, Ann Arbor, Jackson	Detroit, Ypsilanti, Ann Arbor and Jackson Rwy.	Jan. 1, 1902	Dec. 31, 1902	91.42	91.42	2,600,000	2,600,000
7	Escanaba	Escanaba Electric Street Rwy. Co.	Jan. 1, 1902	Oct. 31, 1902	7.61	7.61	50,000	50,000
8	Grand Rapids	Grand Rapids Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	55.86	55.86	4,000,000	3,500,000
9	Grand Rapids, Grand Haven, Muskegon	Grand Rapids, Grand Haven and Muskegon Rwy. Co.	Feb. 1, 1902	Dec. 31, 1902	45.88	52.63	1,200,000	1,200,000
10	Grand Rapids, Holland, Saugatuck	Grand Rapids, Holland and Lake Michigan Rapid Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	69.00	69.00	1,000,000	1,000,000
11	Houghton, Hancock, Red Jacket	Houghton County Street Rwy. Co.	Jan. 1, 1902	Nov. 30, 1902	22.16	22.16	1,250,000	950,000
12	Ironwood; Hurley (Wis.)	Twin City General Electric Co.	Jan. 1, 1902	Dec. 31, 1902	⁹ 4.60	4.60	400,000	400,000
13	Ishpeming, Negaunee	Negaunee and Ishpeming Street Railway and Electric Co.	Mar. 31, 1901	Mar. 30, 1902	4.69	4.69	125,000	125,000
14	Jackson, Grass Lake	Jackson and Suburban Traction Co.	Jan. 1, 1901	Dec. 31, 1901	20.66	20.66	300,000	140,000
15	Kalamazoo, Galesburg, Augusta, Battle Creek	Michigan Traction Co.	July 1, 1901	June 30, 1902	43.80	43.80	500,000	500,000
16	Lansing	Lansing City Electric Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	7.90	7.90	100,000	100,000
17	Manistee	Manistee, Filer City and Eastlake Rwy. Co.	Apr. 1, 1902	Dec. 31, 1902	15.00	15.00	150,000	150,000
18	Marquette	Marquette City and Presque Isle Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	7.00	7.00	200,000	123,100
19	Menominee	Menominee Electric Light, Railway and Power Co.	May 1, 1901	Apr. 30, 1902	6.71	6.71	110,000	110,000
20	Monroe, Erie; Toledo (Ohio)	Toledo and Monroe Rwy. Co. (including Monroe Traction Co.)	Dec. 1, 1901	Nov. 30, 1902	¹¹ 21.92	¹¹ 21.92	¹² 450,000	¹² 450,000
21	Muskegon	Muskegon Traction and Lighting Co.	Mar. 1, 1902	Dec. 31, 1902	15.20	15.20	600,000	600,000
22	Northville, Plymouth, Wayne	Detroit, Plymouth and Northville Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	17.00	17.00	150,000	150,000
23	Owosso, Corunna	Owosso and Corunna Electric Co.	Jan. 1, 1902	Dec. 31, 1902	4.32	4.32	150,000	150,000
24	Saginaw, Bay City, and vicinity	Saginaw Valley Traction Co.	Feb. 1, 1901	Jan. 31, 1902	35.55	38.65	1,100,000	1,100,000
MINNESOTA.								
Total for state					¹⁴ 316.27	¹⁴ 316.27	25,300,000	23,280,000
1	Duluth	Interstate Traction Co.	Sept. 1, 1901	Aug. 31, 1902	3.14	3.14	50,000	20,000
2	Duluth; Superior (Wis.)	Duluth-Superior Traction Co.	Jan. 1, 1901	Dec. 31, 1901	¹⁵ 70.70	¹⁵ 70.70	5,000,000	5,000,000
3	Minneapolis, St. Paul, Stillwater	Twin City Rapid Transit Co.	Jan. 1, 1901	Dec. 31, 1901	251.02	251.02	20,000,000	18,010,000
4	St. Cloud, Sauk Rapids	Benton Power and Traction Co.	Jan. 1, 1902	Dec. 31, 1902	8.66	8.66	¹² 50,000	¹² 50,000
5	Winona	Winona Railway and Light Co.	July 1, 1901	June 30, 1902	4.65	4.65	200,000	200,000

¹ Not issued, but money paid in.² This company has also a large floating debt.³ Bills payable and receiver's certificates.⁴ Dividends declared on \$150,000 only.⁵ Exclusive of 4.74 miles lying outside of state, but including 30.19 miles in state owned by outside companies. Total owned by companies in state, 1,022.81 miles total operated, 1,057.66 miles.⁶ Exclusive of \$2,068,542, investments other than street railways and electric-light plants owned.⁷ Includes electric-light plant.

GENERAL TABLES.

251

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$100,000	\$67,200										\$67,200	\$14,705	57
1,958,400	1,958,400	8	\$156,672					\$100,000	\$100,000	4	\$2,058,400	22,367	58
370,000	370,000							330,000	330,000	5	700,000	22,981	59
110,000	110,000	5	5,500					45,000	\$217,442	5	217,442	28,021	60
200,000	200,000	2	4,000					200,000	45,000	5	155,000	14,486	61
50,000	50,000								200,000	5	\$400,000	23,995	62
											\$50,000	4,554	63
18,600	18,600										\$18,600	2,510	63a
150,000	6,742							150,000			6,742	6,129	64
20,000	20,000										\$20,000	7,519	65
60,000	60,000										\$60,000	19,802	66
75,000	75,000							60,000	60,000	5	\$135,000	11,139	67
220,000	150,000							125,000	125,000	5	\$275,000	13,682	68
50,000	50,000							30,000	30,000	5	\$80,000	13,136	69
250,000	200,000	6	49,000					75,000	75,000	5	275,000	22,449	70
12,000	12,000										12,000	18,182	71
4,345,000	3,560,000	5	177,500					1,203,000	1,203,000	4 1/2	\$4,753,000	37,606	72
20,000	20,000	5	1,000								20,000	43,478	72a
110,000	110,000	3 1/2	4,125					75,000	75,000	5	185,000	36,062	72b
60,000	60,000										\$60,000	3,667	73
500,000	500,000										\$500,000	24,938	74
40,000	40,000										40,000	24,691	74a
150,000	150,000							150,000	150,000	5	\$300,000	19,317	75
26,875,000	26,588,100		519,500	\$3,245,000	\$2,445,000		\$92,500	43,018,000	32,596,800		61,629,900	\$58,233	
40,000	40,000							25,000	25,000	5	65,000	16,010	1
1,000,000	950,000							670,000	431,000	6	1,381,000	59,270	2
100,000	100,000			45,000	45,000			200,000	200,000	5	\$345,000	32,857	3
12,500,000	12,500,000	4	500,000					25,000,000	17,340,000	4 1/2	\$29,880,000	78,363	4
1,900,000	1,900,000			100,000	100,000	5 1/2	5,500	2,500,000	2,465,000	5, 6	4,465,000	41,585	5
2,600,000	2,600,000							2,600,000	2,600,000	5, 6	5,200,000	56,880	6
50,000	50,000										\$50,000	6,570	7
2,000,000	2,000,000			2,000,000	1,500,000	5	75,000	3,500,000	2,500,000	5	6,000,000	107,411	8
1,200,000	1,200,000							1,500,000	1,250,000	5	2,450,000	58,400	9
1,000,000	1,000,000							2,050,000	1,400,000	5	2,400,000	34,783	10
750,000	750,000			500,000	200,000	6	12,000	750,000	625,000	5	1,575,000	71,074	11
400,000	400,000							200,000	149,000	5	\$549,000	119,348	12
125,000	125,000	4	5,000								\$125,000	26,652	13
300,000	140,000	6	9,000					400,000	300,000	5	440,000	21,297	14
500,000	500,000							800,000	800,000	5, 6	1,300,000	29,690	15
100,000	100,000							100,000	100,000	5	200,000	25,316	16
150,000	150,000							270,000	270,000	5, 6	420,000	28,000	17
200,000	123,100							75,000	37,300	6, 7	160,400	22,914	18
110,000	110,000	5	5,500					58,000	24,500	5	\$184,500	20,045	19
250,000	250,000			200,000	200,000			\$260,000	\$245,000	5	900,000	41,058	20
600,000	600,000							600,000	600,000	5	\$1,200,000	\$2,368	21
150,000	150,000							150,000	150,000	5	300,000	17,647	22
150,000	150,000							120,000	120,000	5	\$270,000	62,500	23
700,000	700,000			400,000	400,000			850,000	720,000	5	\$1,820,000	51,195	24
20,800,000	18,780,000		600,400	4,500,000	4,500,000		270,000	14,768,000	13,226,000		\$36,506,000	107,952	
50,000	20,000							50,000	20,000	6	40,000	12,739	1
3,500,000	3,500,000			1,500,000	1,500,000	4	60,000	2,500,000	2,100,000	5	7,100,000	100,424	2
17,000,000	15,010,000	4	600,400	3,000,000	3,000,000	7	210,000	12,000,000	10,888,000	5, 6, 7	28,898,000	115,122	3
50,000	50,000							\$18,000	\$18,000	5	68,000	7,852	4
200,000	200,000							200,000	200,000	5	\$400,000	86,022	5

* Includes investments other than street railways.

* Includes 2.24 miles in Wisconsin.

* Includes electric-light plant and other investments.

* Includes 2.50 miles in Ohio.

* Not reported; obtained from street-railway journals and directories.

* Exclusive of \$100,000, investments other than street railways and electric-light plants owned.

* Exclusive of 21.90 miles lying outside of state. Total owned and operated by companies in state, 338.17 miles.

* Includes 21.90 miles in Wisconsin.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
MISSISSIPPI.								
	Total for state				25.30	25.30	\$1,075,000	\$626,500
1	Greenville	Greenville Light and Car Co.	Jan. 1, 1902	Dec. 31, 1902	1.00	1.00	25,000	25,000
2	Jackson	Jackson Electric Railway, Light and Power Co.	July 1, 1901	June 30, 1902	5.34	5.34	250,000	250,000
3	Meridian	Meridian Light and Rwy. Co.	Mar. 1, 1902	Feb. 28, 1903	5.71	5.71	400,000	176,500
4	Natchez	Natchez Electric Street Railway and Power Co.	Jan. 29, 1902	June 30, 1902	4.50	4.50	100,000	75,000
5	Vicksburg	Vicksburg Railroad, Power and Manufacturing Co.	July 1, 1901	June 30, 1902	8.75	8.75	300,000	100,000
MISSOURI.								
	Total for state				713.68	720.78	90,592,000	68,334,100
1	Cape Girardeau	Citizens Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	1.75	1.75	20,000	20,000
2	Carrollton	Carrollton Electric Rwy. Co.	June 1, 1901	May 31, 1902	1.88	1.88	10,000	10,000
3	Clinton	Clinton Street Rwy. Co.	July 1, 1901	June 30, 1902	1.35	1.35	10,000	10,000
4	Hannibal	Hannibal Railway and Electric Co.	July 1, 1901	June 30, 1902	4.25	4.25	100,000	100,000
5	Joplin, Carthage, Webb City; Galena (Kans.).	Southwest Missouri Electric Rwy. Co.	Sept. 1, 1901	Aug. 31, 1902	36.61	36.61	800,000	800,000
6	Kansas City, Independence; Kansas City, Argentine, Rosedale (Kans.).	Metropolitan Street Rwy. Co.	June 1, 1901	May 31, 1902	181.24	181.24	8,500,000	5,636,800
7	Nevada	Missouri Water, Light and Traction Co.	Oct. 1, 1901	Sept. 30, 1902	4.12	4.12	100,000	100,000
8	St. Joseph	St. Joseph Railway, Light, Heat and Power Co.	Jan. 1, 1902	Dec. 31, 1902	35.15	35.15	6,000,000	6,000,000
9	St. Louis and vicinity	St. Louis Transit Co.	July 1, 1901	June 30, 1902		360.89	25,000,000	17,264,300
9a	do	United Railways Co. of St. Louis (lessor)	July 1, 1901	June 30, 1902		360.89	45,000,000	33,341,000
10	do	St. Louis and Suburban Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901		36.82	2,500,000	2,500,000
11	St. Louis, Kirkwood, Webster Grove.	St. Louis and Meramec River R. R. Co.	Jan. 1, 1901	Dec. 31, 1901		28.19	1,000,000	1,000,000
12	St. Louis, Kirkwood, Clayton	St. Louis and Kirkwood R. R. Co. (including Brentwood, Clayton and St. Louis R. R. Co.).	Jan. 1, 1901	Dec. 31, 1901		24.97	282,000	282,000
13	St. Louis, Wellston, Bridgeton, Pattonville.	St. Louis, St. Charles and Western R. R. Co.	Jan. 1, 1902	Dec. 31, 1902		16.00	600,000	600,000
14	Sedalia	Railway and Electric Co. of Sedalia	June 1, 1901	May 31, 1902		6.06	250,000	250,000
15	Springfield	Kickapoo Transit Co.	July 1, 1901	June 30, 1902		2.80	20,000	20,000
16	do	Springfield Traction Co.	July 1, 1901	June 30, 1902		16.30	400,000	400,000
MONTANA.								
	Total for state				63.21	63.21	2,095,613	2,045,613
1	Anaconda	Anaconda Copper Mining Co. (railway department).	July 1, 1901	June 30, 1902		6.75	175,613	175,613
2	Bozeman	Bozeman Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901		2.50	20,000	20,000
3	Butte, Walkerville	Butte Electric Rwy. Co.	July 1, 1901	June 30, 1902		24.96	1,000,000	1,000,000
4	Great Falls	Great Falls Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901		11.90	200,000	150,000
5	Helena, East Helena	Helena Power and Light Co.	July 1, 1901	June 30, 1902		17.10	700,000	700,000
NEBRASKA.								
	Total for state				1119.56	1119.56	6,135,000	6,012,125
1	Lincoln, Havelock, Normal.	Lincoln Traction Co.	July 1, 1901	June 30, 1902		37.00	1,065,000	979,425
2	Nebraska City	Nebraska City Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901		3.11	50,000	17,500
3	Omaha, South Omaha	Omaha Street Rwy. Co.	Dec. 1, 1900	Nov. 30, 1901		72.00	5,000,000	5,000,000
4	Omaha, Dundee	Metropolitan Cable Rwy. Co.	Dec. 1, 1901	Sept. 30, 1902		1.55	20,000	15,200
NEW HAMPSHIRE.								
	Total for state				1174.45	1174.45	2,403,200	2,333,200
1	Concord	Concord Street Rwy. Co.	July 1, 1901	June 30, 1902		12.71	150,000	100,000
2	Derry, Chester	Chester and Derry Railroad Association	July 1, 1901	June 30, 1902		7.85	50,000	50,000
3	Exeter, Hampton, Dover, Portsmouth, Plaistow; Haverhill, Amesbury (Mass.).	Exeter, Hampton and Amesbury Street Rwy. Co.	July 1, 1901	June 30, 1902		21.61	275,000	275,000
3a		Amesbury and Hampton Street Rwy. Co. (lessor).	Oct. 1, 1901	Sept. 30, 1902		8.75	100,000	100,000
3b		Dover, Somersworth and Rochester Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902		18.20	300,000	500,000
3c		Haverhill and Plaistow Street Rwy. Co. (lessor).	July 1, 1902	Sept. 30, 1902		2.76	30,000	30,000
3d		Haverhill, Plaistow and Newton Street Rwy. Co. (lessor).	May 8, 1902	June 30, 1902		8.47	150,000	150,000
3e		Portsmouth and Exeter Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902		12.24	150,000	150,000
3f		Seabrook and Hampton Beach Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902		5.80	50,000	50,000
4	Keene, Marlboro	Keene Electric Rwy. Co.	July 1, 1901	June 30, 1902		6.52	140,000	120,000
5	Laconia	Laconia Street Rwy. Co.	July 1, 1901	June 30, 1902		8.87	100,000	100,000

1 Includes electric-light plant and other investments.

2 Includes electric-light plant.

3 Exclusive of 45.55 miles lying outside of state, but including .85 mile in state owned by outside companies. Total owned by companies in state, 758.38 miles total operated, 765.48 miles.

4 Exclusive of \$24,379,270, investments other than street railways and electric-light plants owned.

5 Includes 2.31 miles in Kansas.

6 Includes 43.24 miles in Kansas.

GENERAL TABLES.

253

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$1,075,000	\$626,500							\$700,000	\$644,000		\$1,270,500	\$50,217	
25,000	25,000							25,000	25,000	6	\$50,000	50,000	1
250,000	250,000							250,000	250,000	5	\$500,000	93,633	2
400,000	176,500							225,000	171,000	5	\$347,500	60,858	3
100,000	75,000										75,000	16,667	4
300,000	100,000							200,000	198,000	5	\$298,000	34,057	5
68,692,000	50,354,400		\$313,337	\$21,900,000	\$17,979,700		\$769,287	77,840,000	71,474,816		139,808,916	\$132,206	
20,000	20,000										20,000	11,429	1
10,000	10,000							30,000	30,000	6	40,000	21,277	2
10,000	10,000										10,000	7,407	3
100,000	100,000							100,000	46,000	5	146,000	34,353	4
800,000	800,000	4	32,000					800,000	800,000	6	1,600,000	43,704	5
8,500,000	5,636,800	5	281,337					17,880,000	16,038,400	4.5, 6	\$21,675,200	119,594	6
100,000	100,000							100,000	75,000	6	\$175,000	42,476	7
4,200,000	4,200,000			1,800,000	1,800,000			3,500,000	3,100,000	5	\$9,100,000	258,899	8
25,000,000	17,264,300			20,000,000	16,079,700	5	769,287	6,000,000	5,326,000	5	22,590,300	\$223,475	9
25,000,000	17,261,300							45,000,000	41,980,000	4.5, 6	75,321,000	9a	
2,500,000	2,500,000							2,500,000	2,300,000	5, 6	\$4,800,000	130,364	10
1,000,000	1,000,000							1,000,000	1,000,000	6	2,000,000	70,947	11
282,000	282,000										282,000	11,294	12
600,000	600,000							600,000	449,416	5	\$1,049,416	65,588	13
150,000	150,000			100,000	100,000						\$250,000	41,254	14
20,000	20,000										20,000	7,143	15
400,000	400,000							330,000	330,000	5	730,000	44,785	16
2,095,613	2,045,613							1,275,000	1,275,000		3,320,613	52,533	
175,613	175,613										175,613	26,017	1
20,000	20,000										20,000	5,000	2
1,000,000	1,000,000							700,000	700,000	5	1,700,000	69,109	3
200,000	150,000							150,000	150,000	7	300,000	25,210	4
700,000	700,000							\$425,000	\$425,000	5, 6	1,125,000	65,789	5
5,435,000	5,312,225		200,000	700,000	699,900		30,800	2,750,000	2,395,000		8,407,125	73,967	
365,000	279,525			700,000	699,900	5	30,800	250,000	45,000	5	1,024,425	27,687	1
50,000	17,500										17,500	5,627	2
5,000,000	5,000,000	4	200,000					2,500,000	2,350,000	5	7,350,000	102,083	3
20,000	15,200										15,200	9,806	4
2,353,200	2,283,200	3	8,250	50,000	50,000			1,596,000	1,556,000		3,889,200	23,198	
100,000	50,000			50,000	50,000			150,000	118,000	5	218,000	16,994	1
50,000	50,000							50,000	50,000	5	100,000	12,739	2
275,000	275,000	3	8,250					225,000	225,000	5	500,000	23,137	3
100,000	100,000							100,000	100,000	5	200,000	22,857	3a
300,000	300,000							300,000	300,000	5	600,000	32,967	3b
30,000	30,000							30,000	30,000	5	60,000	21,739	3c
150,000	150,000							145,000	145,000	5	295,000	34,829	3d
150,000	150,000							145,000	145,000	5	295,000	24,101	3e
50,000	50,000							50,000	45,000	5	95,000	16,379	3f
140,000	120,000							60,000	60,000	5	180,000	27,607	4
100,000	100,000							91,000	90,000	5	190,000	21,421	5

† Includes investments other than street railways.

* Exclusive of \$17,261,300, stock of lessor company held by operating company, which has also other outside investments.

† Estimated apportionment of total, which covers electric-light plant also.

† Includes 5.90 miles in state owned by outside companies. Total owned and operated by companies in state, 113.66 miles.

†† Exclusive of 11.47 miles lying outside of state, but including 18.27 miles in state owned by outside companies. Total owned and operated by companies in state, 167.65 miles.

†† Includes 11.47 miles in Massachusetts.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
NEW HAMPSHIRE—Continued.								
6	Manchester, Goffstown, Goffs Falls, Massabesic, Nashua.	Manchester Street Rwy. Co	July 1, 1901	June 30, 1902	34.59	34.59	\$520,500	\$520,500
7	Portsmouth, Rye Beach, Northampton.	Nashua Street Rwy. Co. leased to Boston and Northern. (See Massachusetts.) Portsmouth Electric Rwy. (owned and operated by Boston and Maine R. R.). Portsmouth, Kittery and York Street Rwy. Co. (See Maine.)	July 1, 1901	June 30, 1902	19.28	19.28	387,700	387,700
NEW JERSEY.								
Total for state					1 865.66	1 872.96	69,645,250	68,173,440
1	Atlantic City, Longport	West Jersey and Seashore R. R. Co.	Jan. 1, 1901	Dec. 31, 1901	19.03	19.03	(4)	(4)
2	Bridgeton, Millville	Bridgeton and Millville Traction Co	July 1, 1901	June 30, 1902	35.00	35.00	500,000	200,000
3	Brigantine	Brigantine Transportation Co.	Jan. 1, 1901	Dec. 31, 1901	7.75	7.75	306,250	306,250
4	Camden, Gloucester, Woodbury	Camden, Gloucester and Woodbury Rwy. Co. (owned by South Jersey Gas, Electric and Traction Co.).	Jan. 1, 1901	Dec. 31, 1901	21.77	24.78	600,000	600,000
5	Camden, Haddonfield, Moorestown.	Camden and Suburban Rwy. Co	Apr. 1, 1901	Mar. 31, 1902	37.70	67.81	2,000,000	2,000,000
5a		Camden Horse R. R. Co. (lessor)	Jan. 1, 1901	Dec. 31, 1901	30.11		250,000	250,000
6	Cape May	Cape May, Delaware Bay and Sewells Point R. R. Co.	Jan. 1, 1902	Dec. 31, 1902	12.43	12.43	150,000	150,000
7	Elizabeth, Plainfield, Rahway	Elizabeth, Plainfield and Central Jersey Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	60.00	61.50	3,000,000	3,000,000
8	Hackensack, Englewood	New Jersey and Hudson River Railway and Ferry Co.	Jan. 1, 1901	Dec. 31, 1901	15.60	15.60	1,750,000	1,450,000
9	Jersey City, Hoboken, Paterson, Passaic and vicinity.	Jersey City, Hoboken and Paterson Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	139.27	140.56	20,000,000	20,000,000
10	Jersey City, Newark, Bayonne, Elizabeth, Orange, Montclair, Passaic and vicinity.	North Jersey Street Rwy. Co	Jan. 1, 1901	Dec. 31, 1901	45.51	247.58	15,000,000	15,000,000
10a		Consolidated Traction Co. (lessor)	Jan. 1, 1901	Dec. 31, 1901	190.00		15,000,000	15,000,000
10b		Rapid Transit Street Rwy. Co. (lessor)	Jan. 1, 1901	Dec. 31, 1901	12.07		504,000	504,000
11	Matawan, Keyport	Jersey Central Traction Co.	Jan. 1, 1902	June 30, 1902	3.12	3.12	100,000	50,000
12	Long Branch, Eatontown, Red Bank.	Monmouth County Electric Co.	Apr. 1, 1901	Mar. 31, 1902	10.16	10.16	500,000	325,000
13	Long Branch, Asbury Park, Belmar.	Atlantic Coast Electric R. R. Co	Oct. 1, 1901	Sept. 30, 1902	17.95	23.68	1,500,000	1,500,000
13a		Seashore Electric Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	5.73		200,000	200,000
14	Millville, Vineland	Millville Traction Co.	Aug. 1, 1901	July 31, 1902	13.34	13.34	400,000	175,000
15	Mt. Holly	Mt. Holly Street Rwy. Co.	Nov. 1, 1901	Oct. 31, 1902	1.22	1.22	10,000	9,790
16	New Brunswick, South Amboy, Somerville, Raritan.	Middlesex and Somerset Traction Co.	Jan. 1, 1901	Dec. 31, 1901	50.00	50.00	1,500,000	1,500,000
17	Ocean City	Ocean City Electric R. R. Co.	Apr. 1, 1901	Mar. 31, 1902	7.50	7.50	100,000	100,000
18	Orange and vicinity	Orange and Passaic Valley Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	9.89	9.89	1,000,000	1,000,000
19	Orange, South Orange	South Orange and Maplewood Traction Co.	Jan. 1, 1901	Dec. 31, 1901	5.40	5.40	200,000	200,000
20	Perth Amboy, Metuchen	Raritan Traction Co.	July 1, 1901	June 30, 1902	9.06	9.06	1,000,000	740,000
21	Point Pleasant Beach	Point Pleasant Traction, Electric Light and Power Co.	Jan. 1, 1902	Dec. 31, 1902	2.28	2.28	275,000	250,000
22	Rutherford, Carlstadt, Hackett Heights.	Newark and Hackensack Traction Co	Jan. 1, 1901	Dec. 31, 1901	14.87	14.87	700,000	700,000
23	Trenton	Trenton Street Rwy. Co. (including Mercer County Traction Co.).	Jan. 1, 1902	Dec. 31, 1902	43.60	43.60	1,000,000	1,000,000
24	Trenton, Bordentown, Burlington	Camden and Trenton Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	29.50	31.00	1,750,000	1,750,000
25	Trenton, Princeton	Trenton, Lawrenceville and Princeton R. R. Co.	July 1, 1901	June 30, 1902	10.02	10.02	200,000	113,400
26	West Orange	Orange Mountain Traction Co	Oct. 1, 1901	Sept. 30, 1902	1.40	1.40	150,000	100,000
NEW MEXICO.								
Total for territory					2.10	2.10	1025,000	1025,000
1	Albuquerque	Albuquerque Street R. R. Co.	Jan. 1, 1901	Dec. 31, 1901	2.10	2.10	1025,000	1025,000
NEW YORK.								
Total for state					11 2,797.90	11 2,889.10	300,451,805	276,205,672
1	Albany, Rensselaer, Hudson	Albany and Hudson Railway and Power Co.	July 1, 1901	June 30, 1902	42.44	44.50	2,250,000	2,250,000
2	Albany, Troy, Rensselaer	United Traction Co.	July 1, 1901	June 30, 1902	66.76	78.33	5,000,000	4,999,950
2a		Waterford and Cohoes R. R. Co. (lessor)	July 1, 1901	June 30, 1902	2.21		25,000	25,000
2b		Troy and Cohoes R. R. Co. (lessor)	July 1, 1901	June 30, 1902	5.71		50,000	50,000
2c		Lansingburg and Cohoes R. R. Co. (lessor)	July 1, 1901	June 30, 1902	1.15		15,000	15,000
3	Albany, Troy, Cohoes, Glens Falls, Caldwell, Warrensburg.	Hudson Valley Rwy. Co.	July 1, 1901	June 30, 1902	110.73	134.10	3,000,000	2,722,400
4	Albion, Averill Park	Troy and New England Rwy. Co.	July 1, 1901	June 30, 1902	10.00	10.00	350,000	180,000
5	Amsterdam	Amsterdam Street R. R. Co.	July 1, 1901	June 30, 1902	5.73	5.73	1,000,000	1,000,000
6	Auburn	Auburn City Rwy. Co.	July 1, 1901	June 30, 1902	12.01	12.51	300,000	300,000
7	Auburn, Skaneateles	Auburn Interurban Electric R. R. Co.	July 1, 1901	June 30, 1902	7.11	7.11	250,000	250,000
8	Ballston Spa, Middle Grove	Ballston Terminal R. R. Co.	July 1, 1901	June 30, 1902	15.00	15.00	1,500,000	300,000

¹ Includes 4.38 miles in state owned by outside companies. Total owned by companies in state, 861.28 miles; total operated, 868.58 miles.

² Capital reported for 29 companies only, representing 842.25 miles of track owned. (See note 4.)

³ Exclusive of \$880,908, investments other than street railways and electric-light plants owned.

⁴ Capitalization included in that of steam railroad.

⁵ Includes electric-light plant.

⁶ Includes investments other than street railways.

⁷ Exclusive of \$100,000, investments other than street railways.

⁸ Exclusive of \$339,758, investments other than street railways.

GENERAL TABLES.

255

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued:	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$520,500	\$520,500							\$250,000	\$250,000	5	\$770,500	\$22,275	6
387,700	387,700										387,700	20,109	7
68,220,250	67,178,440	.....	\$425,140	\$1,425,000	\$995,000	.....	\$22,500	75,072,750	57,490,750	.....	\$125,664,190	\$148,155	
500,000	200,000	8	16,000					(4) 500,000	(4) 350,000	5	550,000	15,714	2
131,250	131,250			175,000	175,000			64,750	64,750	5	\$371,000	47,871	3
600,000	600,000										600,000	27,561	4
2,000,000	2,000,000							3,000,000	867,000	5	\$2,867,000	76,048	5
250,000	250,000							500,000	500,000	5	750,000	24,909	5a
150,000	150,000							150,000	150,000	6	300,000	24,135	6
3,000,000	3,000,000							2,500,000	1,500,000	5	4,500,000	75,000	7
1,000,000	1,000,000			750,000	450,000	5	22,500	1,500,000	1,100,000	5	2,550,000	157,051	8
20,000,000	20,000,000							20,000,000	16,844,000	5, 6	36,844,000	264,551	9
15,000,000	15,000,000							15,000,000	6,500,000	4	21,500,000		10
15,000,000	15,000,000	2	300,000					21,658,000	21,658,000	5, 6	36,658,000	\$237,589	10a
504,000	504,000	114	59,220					500,000	500,000	5	1,004,000		10b
100,000	50,000							75,000	50,000	5	100,000	32,051	11
500,000	325,000							500,000	325,000	4	650,000	68,976	12
1,500,000	1,500,000							1,350,000	1,350,000	5	2,850,000	\$144,847	13
200,000	200,000	5	10,000					200,000	200,000	6	400,000	69,808	13a
400,000	175,000							400,000	196,000	5	371,000	27,811	14
10,000	9,790										9,790	8,025	15
1,500,000	1,500,000							1,500,000	1,000,000	5	\$2,500,000	50,000	16
100,000	100,000							75,000	75,000	5, 6	175,000	23,333	17
1,000,000	1,000,000							1,000,000	640,000	5	1,640,000	165,824	18
200,000	200,000										200,000	37,037	19
500,000	370,000			500,000	370,000						740,000	81,678	20
275,000	250,000							200,000	85,000	5	\$335,000	146,930	21
700,000	700,000							500,000	500,000	5	1,200,000	80,699	22
1,000,000	1,000,000	4	39,920					2,000,000	2,000,000	5, 6	3,000,000	68,807	23
1,750,000	1,750,000							1,750,000	886,000	5	2,636,000	89,356	24
200,000	113,400							100,000	100,000	5	213,400	21,297	25
150,000	100,000							50,000	50,000	6	150,000	107,143	26
25,000	25,000										25,000	11,905	
25,000	25,000										25,000	11,905	1
294,396,845	270,374,935	.....	6,826,754	6,055,000	5,830,737	.....	54,110	408,114,173	252,929,373	.....	529,135,045	\$177,532	
2,250,000	2,250,000							2,250,000	2,250,000	5	\$4,500,000	106,032	1
5,000,000	4,999,950	5	249,991					5,350,800	4,241,300	4, 5, 6	9,241,250	\$185,721	2
25,000	25,000										25,000	11,312	2a
50,000	50,000	7	3,500								50,000	8,757	2b
15,000	15,000	7	1,050								15,000	13,043	2c
3,000,000	2,722,400							4,000,000	2,141,500	5, 6	4,863,900	43,926	3
350,000	140,000							191,000	183,800	5, 6	363,800	36,380	4
1,000,000	1,000,000							1,250,000	1,000,000	5	\$2,000,000	\$349,040	5
300,000	300,000							300,000	300,000	6	600,000	49,958	6
250,000	250,000							150,000	150,000	5	\$400,000	56,259	7
1,500,000	300,000							1,450,000	385,000	5	685,000	45,667	8

* Exclusive of \$250,000, investments other than street railways.

† Cash investment.

‡ Exclusive of 15.01 miles lying outside of state, but including 3 miles in state owned by outside companies. Total owned by companies in state, 2,808.91 miles, including 36.42 miles leased from steam railroads and bridge company (see note 2, page 256, and note 18, page 260); total operated, 2,901.11 miles.

§ Exclusive of \$36,751,267, investments other than street railways and electric-light plants owned.

|| Exclusive of \$180,498, investments other than street railways.

¶ Capitalization partly balanced by open accounts in connection with further construction.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
NEW YORK—Continued.								
9	Binghamton, Union, Lestershire.	Binghamton Rwy. Co.	July 1, 1901	June 30, 1902	36.76	36.76	\$1,150,000	\$731,860
10	Buffalo, Niagara Falls, Lockport, North Tonawanda.	International Rwy. Co. ¹	July 1, 1901	June 30, 1902	² 222.71	² 225.82	10,120,500	10,120,500
11	Buffalo, West Seneca.	Crosstown Street Rwy. Co. ⁴	July 1, 1901	June 30, 1902	97.77	97.77	3,000,000	2,860,000
12	Buffalo, Depew.	Buffalo and Depew Rwy. Co.	July 1, 1901	June 30, 1902	14.71	14.71	350,000	350,000
13	Buffalo, Hamburg.	Buffalo, Hamburg and Aurora Rwy. Co.	Sept. 9, 1902	Mar. 8, 1903	13.75	13.75	(⁵)	(⁵)
14	Canandaigua.	Ontario Light and Traction Co.	July 1, 1901	June 30, 1902	3.00	3.00	100,000	100,000
15	Catskill.	Catskill Electric Rwy. Co.	July 1, 1901	June 30, 1902	2.90	2.90	400,000	60,000
16	Cohoes.	Cohoes City Rwy. Co.	July 1, 1901	June 30, 1902	6.35	6.35	50,000	50,000
17	Cortland, Homer, McGrawville.	Cortland County Traction Co.	July 1, 1901	June 30, 1902	10.04	10.04	370,000	370,000
18	Corning, Painted Post.	Corning and Painted Post Street Rwy. Co.	July 1, 1901	June 30, 1902	5.90	5.90	100,000	100,000
19	Dunkirk, Fredonia.	Dunkirk and Fredonia R. R. Co.	July 1, 1901	June 30, 1902	3.75	3.75	150,000	136,410
20	Dunkirk.	Dunkirk and Point Gratiot Traction Co.	July 1, 1901	June 30, 1902	3.25	3.25	25,000	25,000
21	Elmira, Elmira Heights, Horseheads.	Elmira Water, Light and R. R. Co.	July 1, 1901	June 30, 1902	14.17	27.24	224,000	224,000
21a	.....	West Water Street R. R. Co. (lessor)	July 1, 1901	June 30, 1902	3.75	.....	25,000	25,000
21b	.....	West Side R. R. Co. (lessor)	July 1, 1901	June 30, 1902	9.32	.....	300,000	105,000
22	Far Rockaway.	Ocean Electric Rwy. Co.	July 1, 1901	June 30, 1902	1.04	1.04	50,000	35,000
23	Fishkill on the Hudson, Fishkill, Matteawan.	Citizens Street Rwy. Co.	July 1, 1901	June 30, 1902	2.95	7.00	75,000	75,000
23a	.....	Fishkill Electric Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	4.05	.....	50,000	50,000
24	Fonda, Johnstown, Gloversville.	Fonda, Johnstown and Gloversville R. R. Co.	July 1, 1901	June 30, 1902	19.01	19.01	400,000	390,210
25	Fulton.	Lake Ontario and Riverside R. R. Co.	July 1, 1901	June 30, 1902	1.04	1.04	15,000	15,000
26	Geneva, Waterloo, Seneca Falls.	Geneva, Waterloo, Seneca Falls and Cayuga Lake Traction Co.	July 1, 1901	June 30, 1902	17.75	17.75	450,000	449,500
27	Gloversville, Johnstown.	Mountain Lake Electric R. R. Co.	July 1, 1901	June 30, 1902	4.50	4.50	60,000	60,000
28	Hoosick Falls; Bennington (Vt.).	Bennington and Hoosick Valley Rwy. Co.	July 1, 1901	June 30, 1902	¹¹ 16.52	¹¹ 16.52	200,000	200,000
29	Hornellsville.	Hornellsville Electric Rwy. Co.	July 1, 1901	June 30, 1902	5.07	5.07	50,000	50,000
30	Hornellsville, Canisteo.	Hornellsville and Canisteo Rwy. Co.	July 1, 1901	June 30, 1902	4.33	5.33	50,000	50,000
31	Huntington.	Huntington R. R. Co.	July 1, 1901	June 30, 1902	3.19	3.19	30,000	30,000
32	Ithaca.	Ithaca Street Rwy. Co. (including Cayuga Lake Electric Rwy. Co.).	July 1, 1901	June 30, 1902	7.68	7.68	325,000	325,000
33	Jamestown.	Jamestown Street Rwy. Co.	July 1, 1901	June 30, 1902	20.78	20.78	250,000	100,000
34	Kingston.	Kingston Consolidated R. R. Co.	July 1, 1901	June 30, 1902	9.16	9.16	400,000	400,000
35	Lewiston, Youngstown.	Lewiston and Youngstown Frontier Rwy. Co.	July 1, 1901	June 30, 1902	8.70	8.70	150,000	134,000
36	Lima, Honeoye Falls, Meridian.	Lima-Honeoye Electric Light and R. R. Co.	July 1, 1901	June 30, 1902	5.16	5.16	100,000	100,000
37	Middletown, Goshen.	Middletown-Goshen Electric Rwy. Co.	July 1, 1901	June 30, 1902	12.84	12.84	100,000	100,000
38	Mineola, Hempstead, Freeport.	New York and Long Island Traction Co.	May 16, 1902	June 30, 1902	9.00	9.00	125,000	125,000
39	Newburg, Walden.	Orange County Traction Co.	July 1, 1901	June 30, 1902	16.49	16.49	325,000	325,000
40	Newpaltz, Highland.	New Paltz and Poughkeepsie Traction Co.	July 1, 1901	June 30, 1902	9.27	9.27	100,000	100,000
41	New York (Manhattan).	Interurban Street R. R. Co. (Metropolitan Street Rwy. Co.). ¹⁴	July 1, 1901	June 30, 1902	1.59	200.83	20,000,000	5,880,000
41a	do.	Metropolitan Street Rwy. Co. (lessor)	Apr. 1, 1902	June 30, 1902	47.92	.....	52,000,000	51,996,500
41b	do.	Bleecker Street and Fulton Ferry R. R. Co. (lessor).	July 1, 1901	June 30, 1902	10.66	.....	900,000	900,000
41c	do.	Broadway and Seventh Avenue Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	15.12	.....	2,100,000	2,100,000
41d	do.	Central Park and North and East River Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	19.56	.....	1,800,000	1,800,000
41e	do.	Elighth Avenue R. R. Co. (lessor)	July 1, 1901	June 30, 1902	18.75	.....	1,000,000	1,000,000
41f	do.	Forty-second Street and Grand Street Ferry Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	7.64	.....	750,000	748,000
41g	do.	New York and Harlem (city line) R. R. Co. (lessor).	July 1, 1901	June 30, 1902	19.63	.....	10,000,000	10,000,000
41h	do.	Ninth Avenue R. R. Co. (lessor)	July 1, 1901	June 30, 1902	15.77	.....	800,000	800,000
41i	do.	Second Avenue R. R. Co. (lessor)	July 1, 1901	June 30, 1902	25.92	.....	2,500,000	1,862,000
41k	do.	Sixth Avenue R. R. Co. (lessor)	July 1, 1901	June 30, 1902	12.03	.....	2,000,000	2,000,000
41l	do.	Twenty-third Street R. R. Co. (lessor).	July 1, 1901	June 30, 1902	4.15	.....	600,000	600,000
42	do.	Central Crosstown R. R. Co. ¹⁷	July 1, 1901	June 30, 1902	4.15	4.00	600,000	600,000
42a	do.	Christopher and Tenth Street R. R. Co. (lessor).	July 1, 1901	June 30, 1902	3.92	.....	650,000	650,000
43	do.	Fulton Street R. R. Co. ¹⁷	July 1, 1901	June 30, 1902	1.06	1.89	500,000	500,000
44	do.	Thirty-fourth Street Crosstown Rwy. Co. ¹⁷	July 1, 1901	June 30, 1902	.97	5.60	1,000,000	1,000,000
45	do.	Twenty-eighth and Twenty-ninth Street Crosstown R. R. Co. ¹⁷	July 1, 1901	June 30, 1902	6.73	7.61	1,500,000	1,500,000
46	New York (Manhattan and Bronx).	Third Avenue R. R. Co. ¹⁹	July 1, 1901	June 30, 1902	27.24	27.42	16,000,000	15,995,800
47	do.	Forty-second Street, Manhattanville and St. Nicholas Avenue Rwy. Co. ²¹	July 1, 1901	June 30, 1902	25.66	30.79	2,500,000	2,500,000
48	do.	Dry Dock, East Broadway and Battery R. R. Co. ²¹	July 1, 1901	June 30, 1902	14.97	20.43	1,200,000	1,200,000
49	do.	Kingsbridge Rwy. Co. ²¹	July 1, 1901	June 30, 1902	6.25	6.25	1,000,000	8,600
50	do.	Southern Boulevard R. R. Co. ²¹	July 1, 1901	June 30, 1902	7.00	7.00	250,000	250,000
51	New York, Yonkers.	Yonkers R. R. Co. ²¹	July 1, 1901	June 30, 1902	28.77	31.27	1,000,000	1,000,000
52	do.	Union Rwy. Co. ²¹	July 1, 1901	June 30, 1902	71.10	71.10	2,000,000	2,000,000

¹ This is a combined report of 6 constituent companies separately for 7 months and the International Railway Company (consolidation) for 5 months. The consolidated company is controlled by the International Traction Company of New Jersey.

² Includes 22.80 miles leased from steam railroads and bridge company.

³ Exclusive of \$361,577, investments other than street railways.

⁴ Controlled by the International Traction Company of New Jersey.

⁵ In hands of receiver.

⁶ Includes electric-light plant.

⁷ Exclusive of \$89,775, investments other than street railways and electric-light plants owned.

⁸ Stock dividend.

⁹ Includes investments other than street railways.

¹⁰ Dividends declared on \$50,000 only.

¹¹ Includes 8.25 miles in Vermont.

GENERAL TABLES.

257

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$1,150,000	\$731,860	2	\$14,014					\$2,500,000	\$1,267,000	5, 6	\$1,998,860	\$54,376	9
10,120,500	10,120,500	4½	491,230					16,371,500	10,328,000	4, 5, 7	20,448,500	100,480	10
3,000,000	2,860,000							3,000,000	2,974,000	5	5,834,000	59,671	11
350,000	350,000							350,000	350,000	5	700,000	47,587	12
								400,000	307,500	5	307,500	22,364	13
100,000	100,000							200,000	185,000	6	285,000	95,000	14
400,000	60,000							400,000	54,000	5	114,000	39,310	15
50,000	50,000							85,000	85,000	6	135,000	21,260	16
170,000	170,000			\$200,000	\$200,000			180,000	180,000	4	550,000	145,839	17
100,000	100,000							100,000	100,000	5	200,000	33,898	18
150,000	136,410	10	*12,310					61,000	61,000	5	197,410	52,643	19
25,000	25,000							65,000	55,000	5	80,000	24,615	20
224,000	224,000							660,000	660,000	5	884,000	62,385	21
25,000	25,000										25,000	6,667	21a
300,000	105,000							355,000	355,000	5	460,000	49,356	21b
50,000	35,000							20,000	20,000	5	55,000	52,846	22
75,000	75,000							75,000	75,000	6	150,000	50,847	23
50,000	50,000							50,000	50,000	6	100,000	24,691	23a
400,000	390,210	8	104,000					1,950,000	600,000	4½, 5, 6	990,210	52,069	24
15,000	15,000							15,000	15,000	6	30,000	28,846	25
350,000	350,000			100,000	99,500			500,000	434,000	4	883,500	49,775	26
60,000	60,000							100,000	65,200	5	125,200	27,822	27
170,000	170,000			30,000	30,000			250,000	182,000	5	382,000	23,123	28
50,000	50,000							70,000	70,000	4	120,000	23,669	29
50,000	50,000							80,000	80,000	4	130,000	19,254	30
30,000	30,000							30,000	25,000	5	56,000	17,555	31
325,000	325,000							325,000	325,000	6	650,000	174,870	32
250,000	100,000							300,000	300,000	6	400,000	19,249	33
400,000	400,000							700,000	700,000	5, 7	1,100,000	120,087	34
150,000	134,000							150,000	134,000	6	268,000	30,806	35
100,000	100,000							60,000	60,000	5	160,000	31,008	36
100,000	100,000							400,000	275,000	4	375,000	29,206	37
125,000	125,000										125,000	13,889	38
150,000	150,000			175,000	175,000			425,000	425,000	5	750,000	46,482	39
100,000	100,000							100,000	100,000	5	200,000	21,575	40
20,000,000	5,880,000										5,880,000		41
52,000,000	51,996,500	7	15,909,939					21,750,000	21,750,000		73,746,500		41a
900,000	900,000	14	13,500					700,000	700,000	4	1,600,000		41b
2,100,000	2,100,000	10	210,000					14,500,000	9,650,000	5	11,750,000		41c
1,800,000	1,800,000	9	162,000					1,200,000	1,200,000	7	3,000,000		41d
1,000,000	1,000,000	16	160,000					1,000,000	1,000,000	6	2,000,000	1494,399	41e
750,000	748,000	18	134,640					250,000	236,000	6	984,000		41f
10,000,000	10,000,000	4	400,000								10,000,000		41g
800,000	800,000	8	64,000								800,000		41h
2,500,000	1,862,000	9	167,580					8,900,000	6,410,000	5	8,272,000		41i
2,000,000	2,000,000	7	140,000								2,000,000		41k
600,000	600,000	18	108,000					400,000	400,000	5, 6	1,000,000		41l
600,000	600,000	10	60,000					250,000	250,000	6	950,000	204,819	42
650,000	650,000	8	52,000					210,000	210,000	4	860,000	18202,372	42a
500,000	500,000							500,000	500,000	4	1,000,000	952,381	43
1,000,000	1,000,000							1,000,000	1,000,000	5	2,000,000	2,061,856	44
1,500,000	1,500,000							1,500,000	1,500,000	5	3,000,000	445,765	45
16,000,000	15,995,800							55,000,000	40,000,000	4, 5	55,995,800	1,671,825	46
2,500,000	2,500,000							2,800,000	2,700,000	4, 5	5,200,000	202,650	47
1,200,000	1,200,000							2,200,000	2,050,000	5	3,250,000	217,101	48
1,000,000	8,600										8,600	1,376	49
250,000	250,000							250,000	250,000	5	500,000	71,429	50
1,000,000	1,000,000							1,000,000	1,000,000	5	2,000,000	69,517	51
2,000,000	2,000,000							2,000,000	2,000,000	5	4,000,000	56,259	52

¹² Exclusive of \$20,000. Investments other than street railways.¹³ Exclusive of \$75,000. Investments other than street railways and electric-light plants owned.¹⁴ Report covers the operations of the Metropolitan Street Railway Company for 9 months and the Interurban Street Railroad Company for 3 months. Capital stock is that of Interurban Street Railroad Company.¹⁵ For 12 months, including period before and after lease was effected.¹⁶ Exclusive of \$22,775,712. Investments other than street railways.¹⁷ Controlled by Metropolitan Street Railway Company.¹⁸ Exclusive of \$66,700. Investments other than street railways.¹⁹ This company is leased to Metropolitan Street Railway Company but is operated independently.²⁰ Exclusive of \$10,455,290. Stocks of other companies. This company has advanced \$11,383,476 for construction work on the 8 subsidiary companies, numbers 47 to 54 inclusive. The total capital liabilities of the 9 companies are \$269,142 per mile of track owned.²¹ Stock owned by Third Avenue Railroad Company; leased with it to Metropolitan Street Railway Company but operated independently.²² See note 20.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
NEW YORK—Continued.								
53	New York, Mamaroneck, White Plains, Scarsdale.	Tarrytown, White Plains and Mamaroneck Rwy. Co. ¹	July 1, 1901	June 30, 1902	18.69	18.69	\$300,000	\$300,000
54	New York, Mt. Vernon, New Rochelle, Pelham.	Westchester Electric R. R. Co. ¹	July 1, 1901	June 30, 1902	31.05	38.22	500,000	500,000
55	New York (Manhattan and Bronx).	Manhattan Rwy. Co. (elevated)	July 1, 1901	June 30, 1902	117.14	117.14	48,000,000	47,999,700
56	New York (Bronx).	Pelham Park R. R. Co.	July 1, 1901	June 30, 1902	1.50	1.50	50,000	50,000
57	do	City Island R. R. Co.	July 1, 1901	June 30, 1902	2.00	2.00	50,000	50,000
58	New York (Brooklyn).	Brooklyn Rapid Transit Co. ⁴	July 1, 1901	June 30, 1902	⁴ 319.42	526.71	⁴ 47,717,305	⁴ 47,717,305
58a	do	Brooklyn City R. R. Co. (lessor)	July 1, 1901	June 30, 1902	204.92		12,000,000	12,000,000
59	do	Coney Island and Brooklyn R. R. Co.	July 1, 1901	June 30, 1902	26.38	50.57	2,000,000	2,000,000
59a	do	Brooklyn City and Newtown R. R. Co. (lessor).	July 1, 1901	June 30, 1902	21.92		2,000,000	1,925,400
60	do	Van Brunt Street and Erie Basin R. R. Co.	July 1, 1901	June 30, 1902	2.50	3.00	200,000	200,000
61	New York (Queens).	New York and Queens County Rwy. Co.	July 1, 1901	June 30, 1902	74.47	74.47	5,000,000	3,100,000
62	do	New York and North Shore Rwy. Co.	July 1, 1901	June 30, 1902	24.00	24.80	600,000	600,000
63	New York (Richmond).	Staten Island Midland R. R. Co.	July 1, 1901	June 30, 1902	27.54	27.64	1,000,000	1,000,000
64	do	Staten Island Electric R. R. Co.	July 1, 1901	June 30, 1902	31.02	31.02	1,250,000	1,250,000
65	Niagara Falls	Niagara Gorge R. R. Co.	July 1, 1901	June 30, 1902	14.40	15.40	1,000,000	1,000,000
66	Northport, East Northport	Northport Traction Co.	Apr. 1, 1902	June 30, 1902	2.74	2.74	50,000	34,000
67	Ogdensburg	Ogdensburg Street Rwy. Co.	July 1, 1901	June 30, 1902	10.00	10.00	150,000	150,000
68	Olean, Bradford (Pa.)	Olean, Rock City and Bradford R. R. Co.	July 1, 1901	June 30, 1902	¹¹ 16.55	¹¹ 18.86	210,000	210,000
69	Olean, Portville, Bolivar.	Olean Street Rwy. Co.	July 1, 1901	June 30, 1902	13.25	13.25	300,000	300,000
70	Oneida	Oneida Rwy. Co.	July 1, 1901	June 30, 1902	1.50	1.50	15,000	15,000
71	Oneonta, Cooperstown	Oneonta, Cooperstown and Richfield Springs Rwy. Co.	July 1, 1901	June 30, 1902	30.00	30.00	1,500,000	750,000
72	Oswining	Westchester Traction Co.	July 1, 1901	June 30, 1902	2.66	2.66	300,000	300,000
73	Oswego	Oswego Traction Co.	July 1, 1901	June 30, 1902	11.15	11.15	300,000	300,000
74	Peekskill, Cortland, Yorktown.	Peekskill Lighting and R. R. Co.	July 1, 1901	June 30, 1902	10.36	10.36	500,000	350,000
75	Penn Yan, Milo, Jerusalem	Penn Yan, Keuka Park and Branchport Rwy. Co.	July 1, 1901	June 30, 1902	9.25	9.25	100,000	94,000
76	Plattsburg	Plattsburg Traction Co.	July 1, 1901	June 30, 1902	6.50	6.50	100,000	100,000
77	Port Chester, Larchmont.	New York and Stamford Rwy. Co.	Aug. 1, 1901	June 30, 1902	16.38	16.53	500,000	500,000
78	Port Jervis	Port Jervis Electric Light, Power, Gas and R. R. Co.	July 1, 1901	June 30, 1902	5.10	5.10	350,000	350,000
79	Poughkeepsie, Wappingers Falls.	Poughkeepsie City and Wappingers Falls Electric Rwy. Co.	July 1, 1901	June 30, 1902	17.33	17.33	750,000	750,000
80	Rochester, Irondequoit	Rochester Rwy. Co.	July 1, 1901	June 30, 1902	86.98	104.92	5,000,000	5,000,000
80a	do	Rochester Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	8.93		200,000	200,000
81	do	Rochester and Suburban Rwy. Co.	July 1, 1901	June 30, 1902	16.30	¹⁵ 11.13	420,000	420,000
82	Rochester, Ontario, Sodus.	Rochester and Sodus Bay Rwy. Co.	July 1, 1901	June 30, 1902	38.14	47.54	1,750,000	1,750,000
82a	do	Irondequoit Park R. R. Co. (lessor).	July 1, 1901	June 30, 1902	5.60		100,000	100,000
83	Charlotte	Rochester, Charlotte and Manitou R. R. Co.	July 1, 1901	June 30, 1902	7.75	7.75	100,000	97,500
84	Rome	Rome City Street Rwy. Co.	July 1, 1901	June 30, 1902	6.06	6.06	150,000	150,000
85	Schenectady, Rotterdam, Albany.	Schenectady Rwy. Co.	July 1, 1901	June 30, 1902	36.12	42.78	600,000	600,000
86	Sea Cliff	Sea Cliff Incline Cable Rwy. Co.	July 1, 1901	June 30, 1902	.18	.18	10,000	9,500
87	South Beach, Midland Beach.	Southfield Beach R. R. Co.	Aug. 10, 1901	June 30, 1902	4.00	4.00	250,000	250,000
88	Syracuse, Onondaga, Geddes, De Witt.	Syracuse Rapid Transit Rwy. Co.	July 1, 1901	June 30, 1902	59.61	68.16	4,000,000	4,000,000
88a	do	East Side Traction Co. (lessor).	July 1, 1901	June 30, 1902	8.55		300,000	300,000
89	Syracuse, Fayetteville, Manlius.	Syracuse and Suburban R. R. Co.	July 1, 1901	June 30, 1902	14.31	14.31	400,000	400,000
90	Syracuse, Baldwinsville.	Syracuse, Lakeside and Baldwinsville Rwy. Co.	July 1, 1901	June 30, 1902	23.03	23.03	500,000	500,000
91	Utica, Rome, Little Falls.	Utica and Mohawk Valley Rwy. Co. ¹⁷	July 1, 1901	June 30, 1902	¹⁸ 76.20	¹⁸ 76.20	3,100,000	461,237
92	Watertown, Brownville.	Black River Traction Co.	July 1, 1901	June 30, 1902	10.47	10.47	105,000	105,000
93	Watkins, Montour Falls, Horseheads.	Elmira and Seneca Lake Rwy. Co.	July 1, 1901	June 30, 1902	16.41	16.41	300,000	300,000
94	West Seneca, Gardenville, Ebenezzer.	Buffalo, Gardenville and Ebenezzer Rwy. Co.	July 1, 1901	June 30, 1902	4.67	4.67	40,000	39,300
95	West Seneca, Hamburg	Hamburg Rwy. Co.	July 1, 1901	June 30, 1902	10.33	10.33	200,000	200,000
96	Williamsville.	Buffalo and Williamsville Electric Rwy. Co.	July 1, 1901	June 30, 1902	4.54	4.54	75,000	75,000
NORTH CAROLINA.								
Total for state					¹⁹ 46.32	58.76	3,275,000	1,995,625
1	Asheville.	Asheville Electric Co.	July 1, 1901	June 30, 1902	5.87	5.87	750,000	511,700
2	Asheville, Biltmore.	Asheville Street R. R. Co.	July 1, 1901	June 30, 1902	7.64	8.06	500,000	266,325
3	Asheville and vicinity	Asheville and Craggy Mountain Rwy. Co.	July 1, 1901	June 30, 1902	3.24	15.24	250,000	24,200
4	Charlotte and vicinity	Charlotte Electric Railway, Light and Power Co.	Jan. 1, 1902	Dec. 31, 1902	11.29	11.29	500,000	60,000
5	Raleigh	Raleigh Electric Co.	May 1, 1901	Apr. 30, 1902	¹⁹ 4.50	4.50	75,000	58,800
6	Wilmington, Wrightsville.	Consolidated Railways, Light and Power Co.	July 1, 1901	June 30, 1902	4.65	4.65	500,000	400,000
7	Winston-Salem	Fries Manufacturing and Power Co.	Dec. 1, 1901	Nov. 30, 1902	9.13	9.13	700,000	674,600

¹ Stock owned by Third Avenue Railroad Company; leased with it to Metropolitan Street Railway Company but operated independently.² See note 20, page 55.³ Exclusive of \$40,023, investments other than street railways.⁴ Includes the statistics for the following companies, which are controlled by ownership of stock: Brooklyn Heights; Nassau; Sea Beach; Brooklyn Union Elevated; Prospect Park and Coney Island; New York and Coney Island; New York and Brooklyn Bridge; Brooklyn, Queens County and Suburban; and Coney Island and Gravesend.⁵ Includes 67.02 miles of elevated track.⁶ Includes \$2,717,305, outstanding shares of controlled companies.⁷ Exclusive of \$1,000,000, investments other than street railways.⁸ Includes investments other than street railways.⁹ Exclusive of \$260,000, investments other than street railways.¹⁰ Exclusive of \$903,875, investments other than street railways.¹¹ Includes 6.76 miles in Pennsylvania.

GENERAL TABLES.

259

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$300,000	\$300,000							\$300,000	\$300,000	5	\$600,000	\$32,108	53
500,000	500,000							500,000	500,000	5	1,000,000	\$32,206	54
48,000,000	47,999,700	4	\$1,920,000					51,818,000	39,545,000	4.5, 6	87,544,700	747,351	55
50,000	50,000							50,000	50,000	6	100,000	\$39,965	56
50,000	50,000							27,873	27,873	6	77,873	38,986	57
47,717,305	47,717,305							150,000,000	52,524,000	5	100,241,305	313,823	58
12,000,000	12,000,000	10	1,200,000					6,925,000	6,925,000	4 1/2, 5, 6	18,925,000	92,353	58a
2,000,000	2,000,000	16	320,000					2,000,000	2,000,000	4.5	4,000,000	113,723	59
2,000,000	1,923,400							2,000,000	2,000,000	5	\$3,923,400	178,987	59a
200,000	200,000	4	8,000					75,000	65,000	5	265,000	106,000	60
5,000,000	3,100,000							4,200,000	3,000,000	4.5, 6	6,100,000	81,912	61
600,000	600,000							600,000	600,000	5	1,200,000	50,000	62
1,000,000	1,000,000							1,000,000	1,000,000	5	2,000,000	72,622	63
1,250,000	1,250,000							2,000,000	2,000,000	5	3,250,000	\$96,389	64
1,000,000	1,000,000							1,000,000	1,000,000	5	2,000,000	76,120	65
50,000	34,000										34,000	12,409	66
150,000	150,000							150,000	150,000	6	300,000	30,000	67
210,000	210,000							200,000	200,000	6	410,000	24,773	68
300,000	300,000							266,000	278,500	5	578,500	43,660	69
15,000	15,000							10,000	10,000	4	25,000	16,667	70
1,500,000	750,000							1,500,000	750,000	5	1,500,000	50,000	71
300,000	300,000							150,000	138,000	5	438,000	164,682	72
200,000	200,000			\$100,000	\$100,000			300,000	288,000	3.5	588,000	52,735	73
500,000	350,000							750,000	500,000	5	\$850,000	82,046	74
100,000	94,000							100,000	100,000	6	194,000	20,973	75
100,000	100,000							100,000	80,000	6	180,000	27,692	76
500,000	500,000							500,000	365,000	5	\$65,000	52,808	77
350,000	350,000							450,000	200,000	5	\$250,000	107,843	78
750,000	750,000							500,000	404,000	5	1,154,000	66,590	79
2,500,000	2,500,000			2,500,000	2,500,000	24	\$54,110	5,457,000	4,555,950	5, 6	9,555,950	\$108,075	80
200,000	200,000	8	16,000								\$200,000	22,396	80a
70,000	70,000			\$50,000	\$50,000			450,000			420,000	25,767	81
1,000,000	1,000,000			750,000	750,000						1,750,000	\$44,048	82
100,000	100,000	5	5,000								100,000	17,857	82a
100,000	97,500							82,000	81,250	5	178,750	23,065	83
150,000	150,000							200,000	123,500	5	273,500	45,182	84
600,000	600,000							2,000,000	1,050,000	4 1/2	\$1,650,000	45,681	85
10,000	9,500							2,000	2,000	4	11,500	63,889	86
250,000	250,000							150,000	21,000	5	271,000	67,750	87
2,750,000	2,750,000			1,250,000	1,250,000			4,750,000	3,836,000	5	\$7,836,000	131,454	88
300,000	300,000							250,000	250,000	5	550,000	64,327	88a
400,000	400,000							483,000	427,000	5.6	827,000	57,792	89
500,000	500,000							650,000	500,000	5	\$1,000,000	43,422	90
2,500,000	85,000			600,000	376,237			4,850,000	2,150,000	4 1/2, 5	2,611,237	41,726	91
105,000	105,000							55,000	55,000	5	160,000	15,282	92
300,000	300,000							300,000	300,000	5	600,000	36,563	93
40,000	39,300							25,000	22,000	6	61,300	13,126	94
200,000	200,000							300,000	200,000	5	400,000	38,722	95
75,000	75,000										75,000	16,520	96
2,825,000	1,657,660			450,000	337,965			2,825,000	1,880,500		3,876,125	\$70,250	
750,000	511,700							750,000	496,000	5	\$1,007,700	171,670	1
300,000	78,360			200,000	187,965			100,000	100,000	6	366,325	47,948	2
250,000	24,200							500,000	26,000	6	\$50,200	15,494	3
500,000	60,000							500,000	350,000	5	\$410,000	36,315	4
75,000	58,800							75,000	58,500	5	\$117,300	27,600	5
350,000	350,000			150,000	50,000			400,000	400,000	5	\$800,000	172,043	6
600,000	574,600			100,000	100,000			500,000	450,000	5	\$1,124,600	\$118,690	7

¹² Includes electric-light plant and other investments.¹³ Includes electric-light plant.¹⁴ Exclusive of \$161,000, investments other than street railways.¹⁵ Exclusive of 9.06 miles leased to an operating company.¹⁶ Exclusive of \$70,000, investments other than street railways.¹⁷ This is a combined report of 6 constituent companies separately for 5 months and the Utica and Mohawk Valley Railway Company (consolidation) for 7 months.¹⁸ Includes 13.62 miles leased from steam railroad.¹⁹ Includes .25 mile leased from city.²⁰ Exclusive of \$639,690, investments other than street railways and electric-light plants owned.²¹ Exclusive of \$40,957, investments other than street railways and electric-light plants owned.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
	OHIO.							
	Total for state.....				12,338.50	12,454.83	\$120,507,200	\$108,893,650
1	Ashtabula.....	Ashtabula Rapid Transit Co.....	Jan. 1, 1902	Dec. 31, 1902	5.75	5.75	150,000	150,000
2	Ashtabula, Conneaut, Jefferson.....	Pennsylvania and Ohio Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	27.75	27.75	700,000	680,000
3	Bucyrus, Gallon, Crestline, Mansfield.....	Ohio Central Traction Co.....	July 1, 1901	June 30, 1902	17.02	17.02	225,000	225,000
4	Cambridge.....	Consolidated Co.....	July 1, 1901	June 30, 1902	2.00	2.00	500,000	300,000
5	Canton, Alliance, Sebring.....	Stark Electric R. R. Co.*.....	Jan. 1, 1902	Dec. 31, 1902	26.97	26.97	1,000,000	850,000
6	Canton, Massillon, Akron.....	Canton-Akron Rwy. Co.....	June 1, 1902	Dec. 31, 1902	50.17	50.17	1,600,000	1,600,000
7	Chillicothe.....	Chillicothe Electric Railroad, Light and Power Co.....	July 1, 1901	June 30, 1902	5.11	5.11	100,000	100,000
8	Cincinnati and vicinity.....	Cincinnati Traction Co.....	Jan. 1, 1902	Dec. 31, 1902		212.96	2,000,000	2,000,000
9	Cincinnati.....	Cincinnati Street Rwy. Co. (lessor).....	Jan. 1, 1902	Dec. 31, 1902	212.96		20,000,000	18,011,450
10	Cincinnati, Glendale.....	Price Hill Incline Plane R. R. Co.....	Nov. 1, 1901	Oct. 31, 1902	.61	.61	75,000	75,000
11	Cincinnati, Hamilton, Dayton.....	Mill Creek Valley Street R. R. Co.....	July 1, 1901	June 30, 1902	82.50	86.50	2,200,000	1,800,000
		Cincinnati, Dayton and Toledo Traction Co.....	June 1, 1901	May 31, 1902	78.85	78.85	5,000,000	3,000,000
12	Cincinnati; Lawrenceburg (Ind.).....	Cincinnati, Lawrenceburg and Aurora Electric Street R. R. Co.....	Jan. 1, 1901	Dec. 31, 1901	*39.25	*39.25	750,000	750,000
13	Cleveland and vicinity.....	Cleveland Electric Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	137.34	143.32	13,000,000	13,000,000
14	do.....	Cleveland City Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	*99.70	94.58	8,000,000	7,600,000
15	Cleveland, Berea, Elyria, Oberlin, Lorain, Wellington.....	Cleveland, Elyria and Western Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	68.00	76.50	2,000,000	1,500,000
16	Cleveland, Chagrin Falls, Chardon, Garrettsville.....	Eastern Ohio Traction Co.....	Jan. 1, 1901	Dec. 31, 1901	90.00	101.00	2,500,000	2,500,000
17	Cleveland, Painesville, Fairport.....	Cleveland, Painesville and Eastern R.R. Co.....	Jan. 1, 1902	Dec. 31, 1902	43.26	43.26	2,000,000	1,566,000
18	Cleveland, Kent, Ravenna, Akron, Barberton.....	Northern Ohio Traction Co.....	Jan. 1, 1901	Dec. 31, 1901	96.85	110.25	3,500,000	3,500,000
19	Columbus and vicinity.....	Columbus Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	106.43	106.43	7,000,000	6,000,000
20	Columbus, London, Springfield.....	Columbus, London and Springfield Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	58.60	72.60	1,500,000	1,500,000
20a		Columbus, Grove City and Southwestern Rwy. Co. (lessor).....	Jan. 1, 1902	Dec. 31, 1902	14.00		250,000	250,000
21	Columbus, Newark.....	Columbus, Buckeye Lake and Newark Traction Co.....	Mar. 1, 1902	Nov. 30, 1902	43.50	45.06	1,500,000	1,500,000
22	Dayton.....	City Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	24.28	26.55	2,100,000	2,090,600
23	do.....	Peoples Rwy. Co.....	July 1, 1901	June 30, 1902	20.70	22.70	1,100,000	1,100,000
24	do.....	Oakwood Street Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	7.90	7.90	19,000	19,000
25	Dayton, Alexandria, Eaton.....	Dayton and Western Traction Co.....	Jan. 1, 1901	Dec. 31, 1901	22.25	28.25	800,000	800,000
26	Dayton, Arvanum, Greenville.....	Dayton and Northern Traction Co.....	Oct. 1, 1901	Sept. 30, 1902	40.05	44.91	450,000	450,000
27	Dayton, Springfield, Urbana.....	Dayton, Springfield and Urbana Electric Rwy. Co. ¹⁰	July 1, 1901	June 30, 1902	48.63	55.60	1,500,000	759,500
27a		Springfield and Western Traction Co. (lessor).....	July 1, 1901	June 30, 1902	5.44		250,000	250,000
28	Dayton, Troy, Piqua.....	Dayton and Troy Electric Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	28.00	46.70	1,000,000	1,000,000
28a		Miami Valley Rwy. Co. (lessor).....	Jan. 1, 1902	Dec. 31, 1902	14.70		300,000	300,000
29	Dayton, Xenia.....	Dayton and Xenia Transit Co.....	July 1, 1901	June 30, 1902	50.12	53.01	800,000	800,000
30	Defiance.....	Peoples Gas and Electric Co.....	June 1, 1901	May 31, 1902	4.53	4.53	100,000	100,000
31	Delaware.....	Delaware Electric Street Rwy. Co.....	June 1, 1901	Mar. 31, 1902	7.50	7.50	50,000	50,000
32	Dennison, Uhrichsville.....	United Electric Co.....	Jan. 1, 1902	Dec. 31, 1902	2.03	2.03	28,200	28,200
33	East Liverpool, Wellsville.....	East Liverpool Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	14.71	14.71	300,000	300,000
34	Lancaster.....	Lancaster Traction Co.....	Jan. 1, 1902	Dec. 31, 1902	3.81	3.81	100,000	100,000
35	Lima.....	Lima Electric Railway and Light Co.....	Jan. 1, 1902	Dec. 31, 1902	18.55	20.55	400,000	400,000
36	Lima, Wapakoneta, Celina, Sidney, Piqua.....	Western Ohio Rwy. Co.....	Mar. 15, 1902	Jan. 14, 1903	77.97	80.57	3,000,000	2,063,000
37	Lorain, Elyria.....	Lorain Street Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	11.67	11.67	750,000	750,000
38	Mansfield, Shelby.....	Mansfield Electric Railway, Light and Power Co.....	Jan. 1, 1902	Dec. 31, 1902	21.00	21.00	400,000	400,000
39	Marion.....	Marion Street Rwy. Co.....	Apr. 1, 1901	Mar. 31, 1902	4.28	4.28	100,000	50,000
40	Mt. Vernon.....	Mt. Vernon Electric Rwy. Co.....	Feb. 1, 1902	Jan. 31, 1903	5.10	5.10	400,000	75,000
41	Newark, Granville.....	Newark and Granville Street Rwy. Co.....	Jan. 1, 1902	Dec. 31, 1902	13.89	13.89	300,000	300,000
42	New Philadelphia, Canal Dover, Uhrichsville.....	Tuscarawas Traction Co.....	Jan. 1, 1902	Dec. 31, 1902	13.43	13.43	250,000	244,000
43	Pomeroy, Middleport, Racine.....	Ohio River Electric Railway and Power Co.....	July 1, 1901	June 30, 1902	13.02	13.02	300,000	300,000
44	Portsmouth.....	Portsmouth Street Railroad and Light Co.....	Jan. 1, 1902	Dec. 31, 1902	5.50	5.50	125,000	125,000
45	Salem.....	Salem Electric Rwy. Co.....	July 1, 1901	June 30, 1902	2.65	2.65	100,000	100,000
46	Springfield.....	Springfield Rwy. Co.....	July 1, 1901	June 30, 1902	28.13	28.13	1,000,000	1,000,000
47	Springfield, Xenia.....	Springfield and Xenia Traction Co.....	July 1, 1902	Nov. 30, 1902	18.08	18.68	500,000	500,000
48	Steubenville.....	Steubenville and Pleasant Heights Traction Co.....	May 1, 1902	Dec. 31, 1902	3.08	3.08	150,000	150,000
49	Steubenville, Toronto.....	Steubenville Traction and Light Co.....	Jan. 1, 1902	Dec. 31, 1902	12.78	12.78	400,000	400,000
50	Tiffin.....	Electric Railway and Power Co.....	Jan. 1, 1901	Dec. 31, 1901	7.33	7.33	50,000	50,000
51	Tiffin, Bascom, Fostoria.....	Tiffin, Fostoria and Eastern Electric Rwy. Co.....	May 1, 1901	Apr. 30, 1902	17.00	17.00	175,000	175,000
52	Toledo.....	Toledo Railways and Light Co.....	Jan. 1, 1901	Dec. 31, 1901	97.78	97.78	12,000,000	12,000,000
53	Toledo, Bowling Green, Findlay.....	Toledo, Bowling Green and Southern Traction Co.....	May 1, 1901	Apr. 30, 1902	40.37	52.37	1,500,000	660,000
54	Toledo, Fostoria, Findlay.....	Toledo, Fostoria and Findlay Rwy. Co.....	Nov. 1, 1901	Oct. 31, 1902	16.28	17.28	1,500,000	450,000
55	Toledo, Dennison; Morenci, Adrian (Mich.).....	Toledo and Western Rwy. Co.....	July 1, 1901	June 30, 1902	15 66.59	12 70.59	1,800,000	1,500,000
56	Toledo, Fremont, Sandusky, Norwalk, Lorain, Cleveland.....	Lake Shore Electric Rwy. Co.....	Nov. 1, 1901	Oct. 31, 1902	160.43	183.41	6,000,000	6,000,000
57	Toledo, Maumee, Perrysburg, Waterville.....	Toledo and Maumee Valley Rwy. Co.....	Jan. 1, 1901	Dec. 31, 1901	20.22	28.00	400,000	400,000
58	Wellston, Jackson.....	Wellston and Jackson Belt Rwy. Co. ¹³	July 1, 1901	June 30, 1902	10.50	10.50	500,000	255,000

¹ Exclusive of 63.48 miles lying outside of state, but including 48.55 miles in state owned by outside companies. Total owned by companies in state, 2,353.43 miles; total operated, 2,469.76.

² Exclusive of \$1,147,336, investments other than street railways and electric-light plants owned.

³ Includes electric-light plant.

⁴ Covers operations of Stark Electric Railroad Company and Alliance Electric Railroad Company for the year reported.

⁵ Includes electric-light plant and other investments.

⁶ Includes investments other than street railways.

GENERAL TABLES.

261

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$110,657,200	\$99,643,650		\$2,289,554	\$9,850,000	\$9,250,000		\$341,000	\$73,648,500	\$61,242,000		\$170,135,650	\$71,805	
150,000	150,000							75,000	75,000	6	225,000	39,130	1
700,000	690,000							700,000	690,000	5	1,360,000	49,009	2
225,000	225,000							150,000		5	225,000	13,220	3
500,000	300,000							500,000			300,000	150,000	4
1,000,000	850,000							1,000,000	750,000	5	1,600,000	59,325	5
1,000,000	1,000,000			600,000	600,000	3	18,000	1,673,000	1,673,000	5	3,273,000	65,238	6
100,000	100,000							75,000	75,000	6	175,000	34,247	7
2,000,000	2,000,000	5	100,000								2,000,000		8
20,000,000	18,011,450	5 1/2	979,356					724,500	724,500	5 1/2	18,735,950	97,370	9
75,000	75,000										75,000	122,951	10
1,100,000	800,000			1,100,000	1,000,000	5	737,500				1,800,000	55,385	11
5,000,000	3,000,000							5,000,000	3,500,000	5	6,500,000	82,961	12
750,000	750,000							750,000	750,000	5	1,500,000	38,217	13
13,000,000	13,000,000	4	520,000					4,350,000	4,350,000	5 1/2	17,350,000	126,329	14
8,000,000	7,600,000	5	380,000					2,026,000	2,026,000	5	9,626,000	96,550	15
2,000,000	1,500,000	3	742,000					1,500,000	1,375,000	5 1/2	2,875,000	42,279	16
2,500,000	2,500,000							2,500,000	2,186,000	5	4,686,000	52,067	17
2,000,000	1,556,000							2,000,000	1,402,000	5 1/2	2,958,000	68,377	18
2,500,000	2,500,000			1,000,000	1,000,000	5	50,000	3,000,000	3,000,000	5	6,500,000	67,114	19
3,500,000	3,000,000			3,500,000	3,000,000	5	150,000	7,000,000	5,605,000	4 1/2	11,605,000	109,039	20
1,500,000	1,500,000							1,500,000	1,500,000	5	3,000,000	51,195	21
250,000	250,000							250,000	210,000	5	460,000	32,857	22
1,000,000	1,000,000			500,000	500,000	1 1/2	7,500	1,500,000	1,125,000	5	2,625,000	60,345	23
1,500,000	1,490,600	6	89,436	600,000	600,000	6	36,000	65,000	65,000	6	2,155,600	88,781	24
1,100,000	1,100,000	5	55,000					500,000	450,000	5	1,550,000	74,879	25
19,000	19,000	5	950								19,000	2,405	26
400,000	400,000			400,000	400,000	5	20,000				800,000	35,955	27
450,000	450,000	2	9,000					450,000	450,000	5	900,000	22,472	28
1,500,000	759,500	2	15,000					750,000	750,000	5	1,509,500	31,041	29
250,000	250,000							250,000	155,000	5	405,000	74,449	30
500,000	500,000	2 1/2	12,500	500,000	500,000	5	25,000				1,000,000	35,714	31
300,000	300,000	3 1/2	9,600								300,000	20,408	32
650,000	650,000			150,000	150,000			800,000	800,000	5	1,600,000	31,923	33
100,000	100,000	1 1/2	1,850					10,000	7,000	5	107,000	23,620	34
50,000	50,000										50,000	6,667	35
28,200	28,200										28,200	13,892	36
300,000	300,000							435,000	435,000	5	735,000	49,966	37
100,000	100,000							100,000	68,000	5 1/2	168,000	44,094	38
400,000	400,000							400,000	400,000	5	800,000	43,127	39
3,000,000	2,063,000							3,000,000	2,063,000	5	4,126,000	52,918	40
750,000	750,000							750,000	550,000	5 1/2	1,300,000	111,397	41
400,000	400,000							400,000	400,000	5	800,000	38,095	42
100,000	50,000	4	2,000								50,000	11,682	43
400,000	75,000							30,000	24,000	6	99,000	19,412	44
300,000	300,000	5	15,000					250,000	190,000	5	490,000	35,277	45
250,000	244,000	3	115,612					200,000	200,000	5 1/2	444,000	33,060	46
300,000	300,000							315,000	315,000	5	615,000	47,235	47
125,000	125,000							83,000	83,000	6	208,000	37,418	48
100,000	100,000							50,000	50,000	6	150,000	56,804	49
1,000,000	1,000,000	1 1/2	16,500					650,000	600,000	5 1/2	1,600,000	56,879	50
500,000	500,000							500,000	500,000	5	1,000,000	55,319	51
150,000	150,000							50,000	38,000	5	188,000	61,039	52
400,000	400,000							280,000	280,000	5	680,000	53,208	53
50,000	50,000										50,000	6,821	54
175,000	175,000	5	8,750					175,000	175,000	5	350,000	20,588	55
12,000,000	12,000,000							12,000,000	9,875,000	4 1/2	21,875,000	223,717	56
1,500,000	680,000	2 1/2	15,000					1,500,000	1,036,500	5	2,536,500	42,024	57
1,500,000	450,000							1,500,000	450,000	5	900,000	55,283	58
1,400,000	1,500,000							1,250,000	1,250,000	5	2,750,000	41,297	59
4,500,000	4,500,000			1,500,000	1,500,000			6,000,000	4,000,000	5	10,000,000	62,332	60
400,000	400,000							400,000	400,000	5	800,000	39,565	61
500,000	255,000							300,000	300,000	6	555,000	52,457	62

¹ Dividends not declared on full amount of stock shown.

² Includes 9 miles in Indiana.

³ Includes 5.12 miles leased to Cleveland Electric Railway Company.

⁴ This company also leases the Urbana, Bellefontaine and Northern, with 21.75 miles under construction.

⁵ Dividends declared on a part of the stock for 9 months only.

⁶ Includes 30.19 miles in Michigan.

⁷ Leased to and operated by a steam railroad.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owued.	Operated.	Total par value.	
							Authorized.	Issued.
OHIO—Continued.								
59	Worthington, Clintonville.....	Worthington, Clintonville and Columbus Street Rwy. Co.	June 1, 1901	May 31, 1902	5.12	5.12	\$40,000	\$31,900
60	Youngstown.....	Youngstown Park and Falls Street Rwy. Co.	May 1, 1901	Apr. 30, 1902	6.13	6.13	200,000	200,000
61	Youngstown; Sharon, Newcastle (Pa.).....	Youngstown-Sharon Railway and Light Co.	Jan. 1, 1902	Dec. 31, 1902	42.25	42.25	920,000	920,000
62	Youngstown, Warren, Niles, Lowellsville.....	Mahoning Valley Rwy. Co.	July 1, 1901	June 30, 1902	53.53	53.53	2,500,000	2,500,000
63	Zanesville.....	Zanesville Electric Rwy. Co.	July 1, 1901	June 30, 1902	10.00	10.00	300,000	300,000
OREGON.								
Total for state.....					136.67	140.48	4,060,000	2,788,550
1	Astoria.....	Astoria Electric Co.	Mar. 1, 1901	Feb. 28, 1902	4.10	4.10	100,000	100,000
2	Portland.....	Portland Rwy. Co.	July 1, 1901	June 30, 1902	28.03	30.19	800,000	800,000
3	Portland and vicinity.....	City and Suburban Rwy. Co.	Sept. 1, 1901	Aug. 31, 1902	65.50	65.50	2,500,000	1,238,550
4	Portland, Sellwood.....	Portland City and Oregon Rwy. Co.	July 1, 1901	June 30, 1902	24.59	25.99	500,000	500,000
5	Salem.....	Salem Light, Power and Traction Co.	July 1, 1901	June 30, 1902	11.95	11.95	130,000	130,000
6	Union.....	Union Street and Suburban Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	2.50	2.75	20,000	20,000
PENNSYLVANIA.								
Total for state.....					\$2,504.58	\$2,542.07	235,711,100	211,728,495
1	Allentown, South Bethlehem, Easton, Bethlehem, Catasauqua, Emaus, Slatington.....	Lehigh Valley Traction Co.	July 1, 1901	June 30, 1902	54.49	*148.81	3,000,000	2,654,080
1a	.....	Allentown and Slatington Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	21.80	.....	240,000	240,000
1b	.....	Bethlehem and Nazareth Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	10.20	.....	150,000	150,000
1c	.....	Coplay, Egypt and Ironton Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	3.62	.....	150,000	60,000
1d	.....	Easton Consolidated Electric Co. (lessor).	July 1, 1901	June 30, 1902	.....	.....	450,000	450,000
1e	.....	Easton Transit Co. (lessor)*.	July 1, 1901	June 30, 1902	*11.44	.....	300,000	300,000
1f	.....	Easton and Bethlehem Transit Co. (lessor).	July 1, 1901	June 30, 1902	4.11	.....	125,000	125,000
1g	.....	Pennsylvania Motor Co. (lessor).....	July 1, 1901	June 30, 1902	3.34	.....	120,000	*120,000
1h	.....	Freemansburg Street Rwy. Co. (lessor)*.	July 1, 1901	June 30, 1902	7.50	.....	150,000	150,000
1i	.....	Northampton Central Street Rwy. Co. (lessor)*.	July 1, 1901	June 30, 1902	5.81	.....	72,000	72,000
1j	.....	Easton, Palmer and Bethlehem Street Rwy. Co. (lessor)*.	July 1, 1901	June 30, 1902	11.40	.....	200,000	200,000
1k	.....	Slate Belt Electric Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	15.10	.....	360,000	360,000
2	Allentown, Emaus, Quakertown, Lansdale, North Wales, Philadelphia.....	Philadelphia and Lehigh Valley Traction Co.	July 1, 1901	June 30, 1902	39.21	50.05	1,500,000	1,500,000
2a	.....	Quakertown Traction Co. (lessor).....	Oct. 1, 1901	June 30, 1902	10.84	.....	300,000	300,000
3	Allentown, Kutztown.....	Allentown and Kutztown Traction Co. (now Allentown and Reading).	July 1, 1901	June 30, 1902	22.00	22.00	250,000	250,000
4	Altoona.....	Altoona and Logan Valley Electric Rwy. Co.	July 1, 1901	June 30, 1902	19.00	27.50	500,000	415,350
5	Bangor, East Bangor.....	Bangor and East Bangor Street Rwy. Co.	Oct. 15, 1901	June 30, 1902	2.75	2.75	40,000	40,000
6	Beaver Falls, New Brighton, Rochester, Freedom, Monaca, Beaver.....	Beaver Valley Traction Co.	July 1, 1901	June 30, 1902	22.50	22.50	1,000,000	1,000,000
7	Beaver Falls, New Brighton.....	Riverview Electric Street Rwy. Co.	Aug. 12, 1901	June 30, 1902	3.63	3.63	75,000	75,000
8	Beaver Falls, Patterson Heights.....	Patterson Heights Street Rwy. Co.	Nov. 1, 1901	Oct. 31, 1902	.45	.45	6,000	6,000
9	Bloomsburg, West Berwick.....	Columbia and Montour Electric Rwy. Co.	July 1, 1901	June 30, 1902	16.25	16.25	375,000	200,000
10	Bradford, Custer City, Lewis Run.....	Bradford Electric Street Rwy. Co.	July 1, 1901	June 30, 1902	11.47	11.47	130,000	130,000
11	Butler, Lyndora.....	Butler Passenger Rwy. Co.	June 20, 1901	June 19, 1902	7.25	7.25	50,000	50,000
12	Carlisle, Mt. Holly Springs.....	Carlisle and Mt. Holly Rwy. Co.	July 1, 1901	June 30, 1902	6.30	6.80	100,000	100,000
13	Carlisle, Mechanicsburg.....	Cumberland Valley Traction Co.	July 1, 1901	June 30, 1902	20.00	20.00	550,000	446,400
14	Chester, Media, Philadelphia.....	Chester Traction Co.	July 1, 1901	June 30, 1902	.....	32.07	500,000	500,000
14a	.....	Chester, Darby, and Philadelphia Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	6.94	.....	125,000	100,000
14b	.....	Chester and Media Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	5.28	.....	100,000	100,000
14c	.....	Chester and Delaware Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	2.78	.....	100,000	50,000
14d	.....	Chester Street Rwy. Co. (lessor).....	July 1, 1901	June 30, 1902	6.92	.....	150,000	150,000
14e	.....	Union Rwy. Co. (lessor).....	July 1, 1901	June 30, 1902	10.15	.....	200,000	100,000
15	Chester, Swarthmore, Darby.....	Media, Middletown, Aston and Chester Electric Rwy. Co. (including Philadelphia, Morton and Swarthmore Street Passenger Rwy. Co.).	July 1, 1901	June 30, 1902	18.95	18.95	750,000	322,800
16	Chester, Tinicum.....	Philadelphia and Chester Rwy. Co.	July 1, 1901	June 30, 1902	8.72	8.72	350,000	350,000
17	Connellsville.....	Connellsville Suburban Street Rwy. Co.	July 1, 1901	June 30, 1902	2.50	2.50	25,000	25,000
18	Doylestown, Newtown, Langhorne, Bristol.....	Newtown Electric Street Rwy. Co.	July 1, 1901	June 30, 1902	18.70	27.89	300,000	300,000
18a	.....	Newtown, Langhorne and Bristol Trolley Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	9.19	.....	200,000	118,000
19	Doylestown and vicinity.....	Doylestown and Easton Street Rwy. Co.	May 29, 1902	June 30, 1902	6.00	6.00	825,000	85,500
20	Doylestown, Willow Grove.....	Doylestown and Willow Grove Rwy. Co.	July 1, 1901	June 30, 1902	13.38	13.38	500,000	500,000

* Includes 24.29 miles in Pennsylvania.

* Includes electric-light plant.

* Exclusive of 7.38 miles lying outside of state, but including 31.05 miles in state owned by outside companies. Total owned by companies in state, 2,480.91 miles, total operated, 2,518.40 miles.

* Capital reported for 195 companies only, representing 2,476.31 miles of track owned.

* Exclusive of \$31,568,967, investments other than street railways and electric-light plants owned.

GENERAL TABLES.

263

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$40,000	\$31,900							\$12,000	\$12,000	5.6	\$43,900	\$8,574	59
200,000	200,000	6	\$12,000					200,000	194,000	5	394,000	64,274	60
920,000	920,000							920,000	920,000	5	1,840,000	43,550	61
2,500,000	2,500,000							2,500,000	2,500,000	5	5,000,000	93,406	62
300,000	300,000							300,000	250,000	4	550,000	55,000	63
3,850,000	2,568,550		49,048	\$200,000	\$200,000		\$5,000	6,130,000	2,737,000		25,525,550	40,430	
100,000	100,000										100,000	24,390	1
700,000	700,000			100,000	100,000	5	5,000	2,500,000	860,000	5.6	1,680,000	50,222	2
2,500,000	1,238,550	4	49,048					3,000,000	1,247,000	4.6	2,485,550	37,947	3
400,000	400,000			100,000	100,000			500,000	500,000	6	1,060,000	40,667	4
130,000	130,000							130,000	130,000	5	280,000	21,757	5
20,000	20,000										20,000	8,000	6
211,768,900	191,291,115		7,173,485	23,942,200	20,437,380		977,395	90,221,600	75,563,700		4267,292,195	103,267	
2,500,000	2,477,400	34	84,561	500,000	176,680	6	10,600	3,000,000	3,000,000	4	5,654,080		1
240,000	240,000	5	12,000					500,000	500,000	4	740,000		1a
150,000	150,000	5	7,500					150,000	150,000	5	300,000		1b
150,000	60,000							150,000	150,000	5	210,000		1c
450,000	450,000	6	27,000					1,300,000	880,000	5	1,330,000		1d
300,000	300,000							450,000	300,000	5	600,000		1e
125,000	125,000							60,000	60,000	6	185,000		1f
120,000	120,000							60,000	60,000	6	180,000		1g
150,000	150,000							125,000	30,000	5	180,000		1h
72,000	72,000										72,000		1i
100,000	100,000			100,000	100,000			200,000	200,000	5	400,000		1j
360,000	360,000	34	11,700					360,000	360,000	5	720,000		1k
1,500,000	1,500,000							2,500,000	1,932,000	5	3,432,000	46,891	2
300,000	300,000							300,000	300,000	5	1,600,000	55,351	2a
250,000	250,000							250,000	195,000	5	445,000	20,227	3
500,000	415,350	10	41,530					500,000	470,500	5	885,850	46,624	4
40,000	40,000							40,000	40,000	5	80,000	29,091	5
1,000,000	1,000,000							1,000,000	896,000	5.6	1,896,000	84,267	6
75,000	75,000							75,000	75,000	5	150,000	41,322	7
6,000	6,000							6,000	5,700	6	11,700	26,000	8
375,000	200,000							375,000	198,972	5	398,972	24,552	9
130,000	130,000							130,000	127,500	5	257,500	22,450	10
50,000	50,000										50,000	6,897	11
100,000	100,000							100,000	100,000	5	200,000	31,746	12
500,000	402,800			50,000	43,500			300,000	277,500	5	723,800	36,195	13
500,000	500,000	4	20,000					250,000	250,000	5	750,000		14
125,000	100,000	6	6,000					125,000	125,000	5	225,000		14a
100,000	130,000	6	6,000					100,000	100,000	5	200,000		14b
100,000	50,000	10	5,000								50,000		14c
150,000	150,000	10	15,000								150,000		14d
200,000	100,000							200,000	200,000	5	300,000		14e
750,000	322,800							600,000			322,800	17,034	15
350,000	350,000							350,000	270,000	5	620,000	71,101	16
25,000	25,000							175,000	175,000	5	1,200,000	40,000	17
300,000	300,000							300,000	300,000	5	600,000	32,066	18
200,000	118,000							200,000	112,700	5	230,700	25,103	18a
225,000	55,500							652,000	80,000	5	165,500	27,583	19
500,000	500,000							500,000	500,000	4	1,000,000	74,738	20

Includes 4.38 miles in New Jersey.

Excludes of \$1,502,485, investments other than street railways.

This company's stocks are owned by the Easton Consolidated Electric Company.

Excludes of \$1,593,396, investments other than street railways.

Includes investments other than street railways.

Excludes of \$200,100, investments other than street railways.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
PENNSYLVANIA—Continued.								
21	Dubois	Dubois Traction Co.	July 1, 1901	June 30, 1902	1.34	1.34	\$17,500	\$17,500
22	Easton, Nazareth	Easton and Nazareth Street Rwy. Co.	July 1, 1901	June 30, 1902	10.00	10.00	250,000	250,000
23	Erie	Erie Electric Motor Co.	Jan. 1, 1902	Dec. 31, 1902	28.00	28.00	1,250,000	1,250,000
24	Erie, Cambridge Springs	Erie Traction Co.	July 1, 1901	June 30, 1902	28.00	28.00	500,000	500,000
25	Erie, Northeast	Erie Rapid Transit Street Rwy. Co.	Sept. 1, 1901	June 30, 1902	13.00	16.00	500,000	500,000
26	Franklin	Franklin Electric Street Rwy. Co.	July 1, 1901	June 30, 1902	3.74	3.74	60,000	60,000
27	Gettysburg	Gettysburg Transit Co.	July 1, 1901	June 30, 1902	9.50	9.50	100,000	100,000
28	Hanover, McSherrystown	Hanover and McSherrystown Street Rwy. Co.	July 1, 1901	June 30, 1902	3.73	3.73	30,000	30,000
29	Hazleton, Freeland, McAdoo	Lehigh Traction Co.	July 1, 1901	June 30, 1902	20.09	20.09	1,000,000	1,000,000
30	Harrisburg, Middletown, Rockville.	Harrisburg Traction Co.	July 1, 1901	June 30, 1902	32.00	49.00	2,000,000	2,000,000
30a	do	Harrisburg City Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	5.00		125,000	125,000
30b	do	Middletown, Highspire and Steelton Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	12.00		100,000	100,000
31	Harrisburg, Mechanicsburg, and vicinity.	Harrisburg and Mechanicsburg Electric Rwy. Co.	July 1, 1901	June 30, 1902	7.94	15.35	225,000	144,500
31a	do	White Hill and Mechanicsburg Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	7.30		70,000	70,000
32	Johnstown	Cambria Incline Plane Co.	Oct. 1, 1901	Sept. 30, 1902	.34	.34	50,000	50,000
33	Johnstown, Windber.	Johnstown Passenger Rwy. Co.	July 1, 1901	June 30, 1902	31.30	31.30	2,000,000	1,993,950
34	Kittanning, Manorville, Ford City.	Kittanning and Ford City Street Rwy. Co.	July 1, 1901	June 30, 1902	5.25	5.25	50,000	50,000
35	Lancaster, Columbia, Marietta, Strasburg.	Conestoga Traction Co.	July 1, 1901	June 30, 1902	34.53	83.81	4,000,000	4,000,000
35a	do	Lancaster and Columbia Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	9.16		50,000	37,500
35b	do	Lancaster, Mechanicsburg and New Holland Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	20.62		300,000	300,000
35c	do	Lancaster, Petersburg and Manheim Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	8.00		175,000	175,000
35d	do	Lancaster, Willow Street, Lampeter and Strasburg Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	11.50		225,000	225,000
36	Lebanon and vicinity	Lebanon Valley Street Rwy. Co.	July 1, 1901	June 30, 1902	23.00	23.00	500,000	500,000
37	Lewistown, Reedsville	Lewistown and Reedsville Electric Rwy. Co.	July 1, 1901	June 30, 1902	6.25	6.25	150,000	150,000
38	Lock Haven, Mill Hall	Susquehanna Traction Co.	July 1, 1901	June 30, 1902	5.35	5.35	300,000	200,000
39	Lykens, Williamstown, Tower City.	Lykens and Williams Valley Street Rwy. Co.	July 1, 1901	June 30, 1902	10.74	10.74	200,000	188,500
40	McKeesport	Highland Grove Traction Co.	July 1, 1901	June 30, 1902	1.02	3.02	50,000	23,000
41	Mahanoy City, Ashland, Girardville, Shenandoah.	Schuylkill Traction Co.	July 1, 1901	June 30, 1902	28.00	28.00	2,000,000	2,000,000
42	Mauch Chunk, Lehighton	Mauch Chunk, Lehighton and Slatington Street Rwy. Co.	July 1, 1901	June 30, 1902	13.19	13.19	600,000	600,000
43	Meadville, Vallowia	Meadville Traction Co.	Nov. 1, 1901	Oct. 31, 1902	11.00	11.00	350,000	350,000
44	Milton, Watontown	Lewisburg, Milton and Watontown Passenger Rwy. Co.	July 1, 1901	June 30, 1902	9.88	9.88	150,000	150,000
45	Montoursville, Williamsport.	Montoursville Passenger Rwy. Co.	July 1, 1901	June 30, 1902	5.00	5.00	75,000	75,000
46	Newcastle	New Castle Traction Co.	July 1, 1901	June 30, 1902	19.20	19.20	500,000	500,000
47	Newcastle, Edenburg	New Castle and Lowell Rwy. Co.	Feb. 14, 1902	June 30, 1902	12.49	12.49	550,000	550,000
48	Norristown, Bridgeport, Philadelphia.	Schuylkill Valley Traction Co.	July 1, 1901	June 30, 1902		51.31	1,000,000	600,000
48a	do	Montgomery County Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	1.41		150,000	150,000
48b	do	Norristown Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	10.46		75,000	75,000
48c	do	Citizens Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	4.20		80,000	79,520
48d	do	Conshohocken Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	5.07		250,000	145,900
48e	do	Collegeville Electric Street Rwy Co. (lessor).	July 1, 1901	June 30, 1902	.94		7,000	2,500
48f	do	Roxboro, Chestnut Hill and Norristown Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	17.76		450,000	248,400
48g	do	Wissahickon Electric Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	3.44		250,000	239,050
48h	do	Trappe and Limerick Electric Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	8.00		250,000	200,000
49	Norristown, Lansdale	Lansdale and Norristown Electric Rwy. Co.	Sept. 11, 1902	Dec. 31, 1902	10.28	13.28	300,000	300,000
50	Nanticoke	Peoples Street Rwy. Co.	July 1, 1901	June 30, 1902	6.00	6.00	100,000	100,000
51	Oil City, Rouseville, Siverly	Citizens Traction Co.	July 1, 1901	June 30, 1902	13.42	13.42	150,000	150,000
52	Oil City	Oil City Street Rwy. Co.	July 1, 1901	June 30, 1902	4.58	8.10	90,000	90,000
52a	do	Oil City Station Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	3.52		90,000	81,745
53	Philadelphia	Union Traction Co.	July 1, 1901	June 30, 1902		475.46	30,000,000	30,000,000
53a	do	Philadelphia Traction Co. (lessor)	July 1, 1901	June 30, 1902			30,000,000	20,000,000
53b	do	West Philadelphia Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	34.98		750,000	750,000
53c	do	Philadelphia City Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	8.38		1,000,000	1,000,000
53d	do	Philadelphia and Darby Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	17.49		200,000	200,000
53e	do	Union Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	73.50		1,500,000	1,500,000
53f	do	Continental Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	11.91		1,000,000	1,000,000
53g	do	Seventeenth and Nineteenth Streets Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	9.67		500,000	500,000
53h	do	Kessler Street Connecting Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	.16		5,000	5,000
53i	do	Philadelphia and Grays Ferry Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	11.15		1,000,000	618,550

¹ Only \$600,000 of stock had been issued at time dividend was declared.

² Dividends not declared on full amount of stock shown.

³ Exclusive of \$30,000, investments other than street railways.

GENERAL TABLES.

265

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$17,500	\$17,500							\$17,000	\$16,800	6	\$34,300	\$25,597	21
250,000	250,000							250,000	250,000	5	500,000	50,000	22
1,250,000	1,250,000							1,600,000	1,000,000	5, 6	2,250,000	80,357	23
500,000	500,000							500,000	500,000	5	1,000,000	35,714	24
500,000	500,000							350,000	350,000	5	850,000	65,385	25
60,000	60,000							50,000	50,000	6	110,000	29,412	26
100,000	100,000							100,000	100,000	5	200,000	21,053	27
30,000	30,000										30,000	8,043	28
1,000,000	1,000,000							615,000	585,000	5	1,585,000	78,895	29
2,000,000	2,000,000	5	\$100,000					75,000	75,000	6	2,075,000	64,844	30
125,000	125,000	12	15,000								125,000	25,000	30a
100,000	100,000	10	10,000								100,000	8,333	30b
225,000	144,500							224,000	144,500	6	289,000	36,398	31
70,000	70,000										70,000	9,589	31a
50,000	50,000										50,000	147,059	32
2,000,000	1,993,950	8	18,000					2,000,000	1,780,000	4, 6	3,773,950	120,573	33
50,000	50,000							50,000	27,500	6	77,500	14,762	34
3,200,000	3,200,000			\$800,000	\$800,000			2,610,000	1,887,500	4, 5	5,887,500	170,504	35
50,000	37,500	20	7,500					225,000	225,000	5	262,500	28,657	35a
300,000	300,000	8	24,000								300,000	14,549	35b
175,000	175,000	1	1,750								175,000	21,875	35c
225,000	225,000	1	1,125								225,000	19,565	35d
500,000	500,000	2 1/2	211,000					500,000	500,000	5	1,000,000	43,478	36
150,000	150,000							275,000	150,000	5	300,000	43,200	37
300,000	200,000							100,000	43,000	4 1/2, 6	243,000	45,421	38
200,000	188,500							188,000	168,000	5	356,500	33,194	39
50,000	23,000										23,000	22,549	40
1,500,000	1,500,000			500,000	500,000			2,500,000	549,000	4 1/2, 5	2,549,000	91,036	41
600,000	600,000							600,000	500,000	5	1,100,000	83,897	42
350,000	350,000							300,000	300,000	5	650,000	59,091	43
150,000	150,000							150,000	150,000	5	300,000	30,364	44
75,000	75,000							75,000	75,000	5	150,000	30,000	45
500,000	500,000							500,000	500,000	5	1,000,000	52,083	46
550,000	550,000							550,000	550,000	5	1,100,000	88,070	47
1,000,000	500,000							500,000	335,000	5	835,000		48
150,000	150,000							150,000	15,000	6	165,000		48a
66,700	66,700	5 1/2	3,548	8,300	8,300	5 1/2	\$442	75,000	75,000	6	150,000		48b
80,000	79,520	2 1/2	1,985					80,000	80,000	5	159,520		48c
250,000	145,900							250,000	100,000	5	245,900		48d
7,000	2,500										2,500	48,412	48e
450,000	248,400	23 1/2	246,624					450,000	371,000	5	619,400		48f
250,000	239,050	1 1/2	4,303								239,050		48g
250,000	200,000							250,000	200,000	4 1/2	400,000		48h
300,000	300,000							300,000	300,000	5	600,000	58,366	49
100,000	100,000							100,000	100,000	6	200,000	33,833	50
150,000	150,000										150,000	11,177	51
90,000	90,000										115,000	22,380	52
90,000	31,745							40,000	25,000	6	81,745	9,018	52a
30,000,000	30,000,000										30,000,000		53
30,000,000	20,000,000	8	1,600,000					1,800,000	777,428	4	20,777,428		53a
750,000	750,000	20	150,000					996,000	996,000	5, 6	1,746,000		53b
1,000,000	1,000,000	15	150,000					300,000	300,000	5	1,300,000		53c
200,000	200,000	4	8,000					100,000	100,000	4	300,000		53d
1,500,000	1,500,000	19	285,000					750,000	750,000	5	2,250,000		53e
1,000,000	1,000,000	12	120,000					350,000	280,000	6	1,280,000		53f
500,000	500,000	3	15,000					100,000	100,000	5	600,000		53g
5,000	5,000	6	300								5,000		53h
1,000,000	618,550	8	49,484								618,550		53i

^a Exclusive of \$794,131, investments other than street railways.

^b Exclusive of \$12,500, investments other than street railways.

^c The stocks of some of the lessor companies are represented by trust certificates issued on behalf of the Union Traction Company, but this is not an additional liability to that of the stocks held.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
PENNSYLVANIA—Continued.								
53j	Philadelphia	Thirteenth and Fifteenth Streets Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	17.59		\$1,000,000	\$1,000,000
53k	do	Ridge Avenue Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	14.97		750,000	750,000
53l	do	Catharine and Bainbridge Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	5.19		400,000	400,000
53m	do	Huntingdon Street Connecting Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	.17		6,000	6,000
53n	do	Twenty-second Street and Allegheny Avenue Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	14.59		1,000,000	1,000,000
53o	do	Walnut Street Connecting Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	1.40		50,000	50,000
53p	do	Ridge Avenue Connecting Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	.16		6,000	6,000
53q	do	Electric Traction Co. (lessor)	July 1, 1901	June 30, 1902	26.07		8,750,000	8,750,000
53r	do	Frankford and Southwark Philadelphia City Passenger R. R. Co. (lessor).	July 1, 1901	June 30, 1902	46.63		1,875,000	1,875,000
53s	do	Citizens Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	11.50		500,000	500,000
53t	do	Second and Third Streets Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	31.09		1,080,200	1,080,200
53u	do	Peoples Traction Co. (lessor)	July 1, 1901	June 30, 1902			6,000,000	6,000,000
53v	do	Peoples Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	3.58		2,250,000	2,075,000
53w	do	Green and Coates Streets Philadelphia Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	6.07		500,000	500,000
53x	do	Germantown Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	42.97		1,500,000	1,500,000
53y	do	Northern Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	1.30		30,000	15,000
53z	do	Centennial Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	.79		15,000	15,000
53aa	do	Philadelphia, Cheltenham and Jenkintown Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	23.99		60,000	60,000
53bb	do	Girard Avenue Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	2.36		9,000	5,000
53cc	do	Cheltenham Avenue Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	6.17		39,000	39,000
53dd	do	Hillcrest Avenue Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	2.04		10,000	10,000
53ee	do	Citizens East End Street Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	.79		15,000	15,000
53ff	do	Citizens Clearfield and Cambria Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	.33		6,000	6,000
53gg	do	Hestonville, Mantua and Fairmount Passenger R. R. Co. (lessor).	July 1, 1901	June 30, 1902	15.92		2,500,000	2,500,000
53hh	do	Fairmount Park and Haddington Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	5.69		300,000	300,000
53ii	do	Lehigh Avenue Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	5.37		1,000,000	1,000,000
53jj	do	Frankford and Fairmount Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	4.17		7,800	7,800
53kk	do	Germantown and Fairmount Park Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	5.07		8,000	8,000
53ll	do	Empire Passenger Rwy. Co. (lessor)	July 1, 1901	June 30, 1902	12.25		600,000	600,000
54	do	Southwestern Street Rwy. Co.	July 1, 1901	June 30, 1902	15.98	15.98	400,000	400,000
55	Philadelphia, Bristol	Philadelphia, Bristol and Trenton Street Rwy. Co.	July 1, 1901	June 30, 1902	11.81	11.81	250,000	250,000
56	Philadelphia	Philadelphia and West Chester Traction Co.	July 1, 1901	June 30, 1902	20.75	24.08	1,000,000	565,175
56a	do	Ardmore and Llanerch Street Rwy. Co. (lessor).	Jan. 1, 1902	June 30, 1902	3.33		200,000	200,000
57	Philadelphia	Holmesburg, Tacony and Frankford Electric Rwy. Co.	July 1, 1901	June 30, 1902	17.29	18.29	800,000	750,000
58	do	Fairmount Park Transportation Co.	Nov. 1, 1901	Oct. 31, 1902	8.80	8.80	2,000,000	2,000,000
59	Philadelphia, Media and Swarthmore.	Delaware County and Philadelphia Electric Rwy. Co.	July 1, 1901	June 30, 1902	10.00	15.00	500,000	300,000
59a	do	Media, Glen Riddle and Rockdale Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	5.00		6,000	6,000
60	Phoenixville, Spring City	Montgomery and Chester Electric Rwy. Co.	July 1, 1901	June 30, 1902	5.57	5.57	100,000	55,000
61	Pittsburg, Allegheny, Bellevue, Millvale, Etna, Sharpsburg, McKees Rocks, Coraopolis, Carnegie, Wilkinsburg, Braddock, Wilmerding, Pitcairn, Duquesne, Homestead.	Pittsburg Rwy. Co. (The Philadelphia Co.).	Jan. 1, 1902	Dec. 31, 1902	48.51	410.01	5,000,000	5,000,000
61a	do	United Traction Co. of Pittsburg (lessor).	Jan. 1, 1902	Dec. 31, 1902	118.97		*20,647,350	*20,647,350
61b	do	Pittsburg and Birmingham Traction Co. (lessor).	Jan. 1, 1902	Dec. 31, 1902	33.80		3,000,000	3,000,000
61c	do	Mt. Oliver Incline Rwy. Co. (lessor)	Jan. 1, 1902	Dec. 31, 1902	1.78		100,000	100,000
61d	do	Pittsburg Incline Plane Co. (lessor).	Jan. 1, 1902	Dec. 31, 1902	1.00		150,000	150,000
61e	do	Pittsburg and Charleroi Street Rwy. Co. (lessor).	Jan. 1, 1902	Dec. 31, 1902	4.60			
61f	do	East McKeesport Street Rwy. Co. (lessor).	Jan. 1, 1902	Dec. 31, 1902	7.10		250,000	250,000
61g	do	New Homestead Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	1.00		10,000	10,000
61h	do	Consolidated Traction Co. (lessor)	Jan. 1, 1902	Dec. 31, 1902	77.40		*30,000,000	*26,790,600
61i	do	Allegheny Traction Co. (lessor)	Jan. 1, 1902	Dec. 31, 1902	18.50		500,000	500,000
61j	do	Citizens Traction Co. (lessor)	Jan. 1, 1902	Dec. 31, 1902	30.48		3,000,000	3,000,000
61k	do	Monongahela Street Rwy. Co. (lessor).	Jan. 1, 1902	Dec. 31, 1902	55.58		7,000,000	7,000,000
61l	do	Suburban Rapid Transit Street Rwy. Co. (lessor).	Jan. 1, 1902	Dec. 31, 1902	11.29		1,400,000	1,400,000

¹ Exclusive of \$11,163,011, investments other than street railways.

² Includes investments other than street railways.

³ Exclusive of \$563,190, investments other than street railways.

⁴ Includes \$647,350, stock of Federal Street and Pleasant Valley Passenger Railway Company, which has been absorbed by United Traction Company.

⁵ Includes \$33,218, dividends on common stock of Federal Street and Pleasant Valley Passenger Railway Company.

GENERAL TABLES.

267

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$1,000,000	\$1,000,000	24	\$240,000					\$590,000	\$590,000	4 1/2, 5, 6, 7	\$1,590,000	53j	
750,000	750,000	24	180,000								750,000	53k	
400,000	400,000	6	24,000					150,000	150,000	5	550,000	53l	
6,000	6,000	6	360								6,000	53m	
1,000,000	1,000,000	6	60,000								1,000,000	53n	
50,000	50,000	6	3,000								50,000	53o	
6,000	6,000	6	360								6,000	53p	
8,750,000	8,750,000	6 1/2	581,438					282,100	282,100	3 1/2, 7	9,032,100	53q	
1,875,000	1,875,000	34	637,500								1,875,000	53r	
500,000	500,000	28	140,000								500,000	53s	
1,060,200	1,060,200	23	243,846								1,060,200	53t	
6,000,000	6,000,000	10	608,000								6,000,000	53u	
1,500,000	1,500,000	11 1/2	168,000	\$750,000	\$575,000	11 1/2	\$64,319	1,075,000	1,075,000	5, 7	3,150,000	53v	
500,000	500,000	12	60,000								500,000	53w	
1,500,000	1,500,000	10 1/2	157,500					67,500	67,500	5	1,567,500	53x	
30,300	15,000	6	900								15,000	53y	
15,000	15,000	6	900								15,000	53z	
60,000	60,000	6	3,600								60,000	53aa	
9,000	5,000	6	300								5,000	53ab	
39,000	39,000	6	2,340								39,000	53ac	
10,000	10,000	6	600								10,000	53ad	
15,000	15,000	6	900								15,000	53ae	
6,000	6,000	6	360								6,000	53af	
1,966,100	1,966,100	4	78,644	533,900	533,900	6	32,034	1,325,000	1,250,000	3 1/2, 5	3,750,000	53ag	
300,000	300,000	6	18,000								300,000	53ah	
1,000,000	1,000,000										1,000,000	53ai	
7,800	7,800										7,800	53aj	
8,000	8,000										8,000	53ak	
600,000	600,000	6	36,000					200,000	200,000	3 1/2	800,000	53al	
400,000	400,000							400,000	400,000	4, 5	800,000	54	
250,000	250,000							250,000	36,000	5	286,000	55	
1,000,000	565,175							400,000	390,000	5	\$955,175	56	
200,000	200,000										200,000	56a	
800,000	750,000	2 1/2	21,000					400,000	400,000	5	1,150,000	57	
2,000,000	2,000,000							750,000	668,000	5	2,668,000	58	
500,000	300,000	7	21,000					64,000	64,000	6	364,000	59	
6,000	6,000										6,000	59a	
100,000	55,000							100,000	100,000	5	155,000	60	
2,500,000	2,500,000			2,500,000	2,500,000			5,479,000	4,579,000	5	9,579,000	61	
\$17,647,350	\$17,647,350	4, 5	\$118,218	3,000,000	3,000,000	5	150,000	10,000,000	10,000,000	5	30,647,350	61a	
3,000,000	3,000,000	3 1/2	112,500					2,825,000	2,825,000	5	5,825,000	61b	
100,000	100,000	6	6,000					55,000	44,500	6	144,500	61c	
150,000	150,000	10	15,000					250,000	250,000	6	400,000	61d	
												61e	
250,000	250,000							250,000	250,000	5	500,000	61f	
10,000	10,000										10,000	61g	
\$15,000,000	\$14,790,600	1	\$161,470	15,000,000	12,000,000	6	720,000	\$3,938,000	\$3,938,000	5, 6	30,728,600	61h	
500,000	500,000		2,500					750,000	750,000	5	1,250,000	61i	
3,000,000	3,000,000	6	180,000					1,500,000	1,500,000	5	4,500,000	61j	
7,000,000	7,000,000							4,400,000	4,400,000	5	11,400,000	61k	
1,400,000	1,400,000	2, 3	36,000					200,000	200,000	6	1,600,000	61l	

* Exclusive of \$13,915,050, investments other than street railways.

† Road under construction; no statistics shown other than the small amount of track now operated.

‡ Includes \$441,600, stock of controlled companies outstanding.

§ Includes \$17,980, dividends on stock of controlled companies outstanding.

|| Funded debt of controlled companies.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
PENNSYLVANIA—Continued.								
62	Pittsburg	St. Clair Incline Plane Co.	July 1, 1901	June 30, 1902	.80	.80	\$150,000	\$150,000
63	do	Duquesne Incline Plane Co.	Jan. 1, 1901	Dec. 31, 1901	.30	.30	60,000	50,000
64	do	Pittsburg and Castle Shannon R. R. Co.	July 1, 1901	June 30, 1902	.52	.52		
65	do	Monongahela Incline Plane Co.	July 1, 1901	June 30, 1902	.48	.48	250,000	250,000
66	do	Penn Incline Plane Co.	Jan. 1, 1902	Dec. 31, 1902	.34	.34	250,000	250,000
67	Pittsburg, McKeesport, Irwin, Greensburg.	Pittsburg, McKeesport and Greensburg Rwy. Co.	July 1, 1901	June 30, 1902	121.36	121.36	1,500,000	1,000,000
68	Pittsburg, Wilmerding, Duquesne, McKeesport, Mt. Pleasant, Scottsdale, Connellsville, Dunbar, Uniontown.	Pittsburg, McKeesport and Connellsville Rwy. Co.	July 1, 1901	June 30, 1902	56.00	56.00	3,500,000	1,650,000
69	Pottstown	Pottstown Passenger Rwy. Co.	July 1, 1901	June 30, 1902	6.11	6.11	100,000	87,500
70	do	Ringling Rocks Electric Rwy. Co.	July 1, 1901	June 30, 1902	3.80	3.80	100,000	50,000
71	Pottsville, Minersville, St. Clair, Schuylkill Haven, Port Carbon.	Pottsville Union Traction Co. (including lessors).	July 1, 1901	June 30, 1902	30.60	42.80	1,250,000	1,250,000
72	Punxsutawney, Walston	Punxsutawney Street Passenger Rwy. Co.	June 1, 1901	May 31, 1902	12.13	12.13	160,000	160,000
73	Reading, Womelsdorf, Mohrsville, Stony Creek, Temple.	United Traction Co.	July 1, 1901	June 30, 1902		63.44	400,000	400,000
73a		Reading Traction Co. (lessor).	July 1, 1901	June 30, 1902	(2)		1,000,000	1,000,000
73b		East Reading Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	7.95		100,000	100,000
73c		Reading City Passenger Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	25.84		400,000	350,000
73d		Reading and Temple Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	6.41		75,000	73,700
73e		Reading and Womelsdorf Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	14.80		500,000	500,000
73f		Reading and Southwestern Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	8.44		130,000	130,000
74	Sayre, Athens; Waverly (N. Y.).	Waverly, Sayre and Athens Traction Co.	July 1, 1901	June 30, 1902	49.11	49.11	200,000	200,000
75	Reading, Neversink Mountain.	Neversink Mountain R. R. Co.	July 1, 1901	June 30, 1902	8.70	8.70	100,000	100,000
76	Reading, Mt. Penn.	Mt. Penn Gravity Rwy. Co.	July 1, 1901	June 30, 1902	8.00	8.00	100,000	100,000
77	Scranton, Dunmore, Throop, Dickson, Olyphant, Blakely, Archbald, Jermyn, Mayfield, Carbondale.	Scranton Rwy. Co.	July 1, 1901	June 30, 1902	38.10	76.68	6,000,000	3,000,000
77a		Carbondale Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	15.27		450,000	450,000
77b		Lackawanna Valley Traction Co. (lessor).	July 1, 1901	June 30, 1902	3.75		400,000	400,000
77c		Pittston and Scranton Street Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	2.03		75,000	60,000
77d		Scranton and Carbondale Traction Co. (lessor).	July 1, 1901	June 30, 1902	5.55		500,000	500,000
77e		Scranton and Pittston Traction Co. (lessor).	July 1, 1901	June 30, 1902	12.00		1,050,000	976,125
78	Shamokin, Ashland, Centralia, Mt. Carmel.	Shamokin and Mt. Carmel Electric Rwy. Co.	July 1, 1901	June 30, 1902	16.25	20.35	700,000	700,000
78a		Ashland and Centralia Electric Rwy. Co. (lessor).	July 1, 1901	June 30, 1902	3.10		60,000	60,000
79	Shamokin, Edgewood.	Shamokin and Edgewood Electric Rwy. Co.	July 1, 1901	June 30, 1902	3.20	3.20	60,000	60,000
80	Stroudsburg	Stroudsburg Passenger Co.	July 1, 1901	June 30, 1902	2.75	2.75	51,200	51,200
81	Sunbury, Northumberland.	Sunbury and Northumberland Electric Rwy. Co.	July 1, 1901	June 30, 1902	3.90	3.90	125,000	125,000
82	Tamaqua, Lansford, Summit Hill.	Tamaqua and Lansford Street Rwy. Co.	July 1, 1901	June 30, 1902	14.63	14.63	200,000	200,000
83	Tarentum, Natrona, New Kensington.	Tarentum Traction Passenger Rwy. Co.	July 1, 1901	June 30, 1902	6.61	6.61	100,000	50,000
84	Titusville, Pleasantville, Hyde-town.	Titusville Electric Traction Co.	July 1, 1901	June 30, 1902	12.00	12.00	100,000	100,000
85	Warren, Sheffield	Warren Street Rwy. Co.	July 1, 1901	June 30, 1902	20.00	20.00	200,000	150,000
86	Washington	Washington Electric Street Rwy. Co.	June 3, 1901	June 2, 1902	3.26	3.26	125,000	125,000
87	West Chester	West Chester Street Rwy. Co.	July 1, 1901	June 30, 1902	5.86	5.86	60,000	60,000
88	Wilkesbarre, Pittston, Plymouth, Nanticoke, Ashley, Edwardsville, Duryea.	Wilkesbarre and Wyoming Valley Traction Co.	July 1, 1901	June 30, 1902	66.58	66.58	75,043,050	75,043,050
89	Wilkesbarre, Luzerne, Dallas, Harveys Lake.	Wilkesbarre, Dallas and Harveys Lake Rwy. Co.	July 1, 1901	June 30, 1902	13.00	16.50	200,000	200,000
90	Williamsport	Vallamont Traction Co.	July 1, 1901	June 30, 1902	3.47	3.70	200,000	101,700
91	do	South Side Passenger Rwy. Co.	July 1, 1901	June 30, 1902	1.85	2.03	25,000	25,000
92	do	Williamsport Passenger Rwy. Co.	July 1, 1901	June 30, 1902	8.64	8.64	600,000	338,550
93	do	East End Passenger Rwy. Co.	July 1, 1901	June 30, 1902	2.45	2.45	50,000	18,000
94	Windsor, Dallastown, Red Lion.	Red Lion and Windsor Street Rwy. Co.	July 1, 1901	June 30, 1902	2.00	2.00	24,000	800
95	Yardley, Morrisville; Trenton (N. J.).	Yardley, Morrisville and Trenton Street Rwy. Co.	July 1, 1901	June 30, 1902	5.99	5.99	100,000	100,000
96	York, Dover	York and Dover Electric Rwy. Co.	July 1, 1901	June 30, 1902	7.93	9.06	50,000	50,000
97	York, Spry, Dallastown	York and Dallastown Electric Rwy. Co.	July 1, 1901	June 30, 1902	6.28	7.42	60,000	60,000
98	York, North York	York Street Rwy. Co.	July 1, 1901	June 30, 1902	12.25	12.25	200,000	200,000
RHODE ISLAND.								
Total for state					10342.92	10350.35	16,475,000	16,375,000
1	Narragansett Pier, Wickford, East Greenwich.	Sea View R. R. Co.	July 1, 1901	June 30, 1902	18.88	18.88	700,000	700,000
	Newport; Fall River (Mass.).	Newport and Fall River Street Rwy. Co. ¹²						
2	Pawtucket, Central Falls	Pawtucket Street Rwy. Co.	Apr. 1, 1901	Mar. 31, 1902	19.71	19.71	500,000	500,000
3	Providence, Pawtucket	Union R. R. Co.	Apr. 1, 1901	Mar. 31, 1902	137.05	111.08	9,000,000	9,000,000

¹ Road not completed; entire trackage will be 30 miles.² This company leases the trackage of the 4 subsidiary companies, and subleases to the United Traction Company.³ Exclusive of \$965,433, investments other than street railways.⁴ Includes 3 miles in New York.⁵ Exclusive of \$1,119,215, investments other than street railways.⁶ Includes investments other than street railways.

GENERAL TABLES.

269

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$150,000	\$150,000							\$75,000	\$75,000	6	\$225,000	\$21,250	62
60,000	50,000	12	86,000								50,000	166,667	63
250,000	250,000	8	30,000					165,000	165,000	6	165,000	317,308	64
250,000	250,000										250,000	520,833	65
1,500,000	1,000,000							1,500,000	1,000,000	5	2,000,000	735,294	66
3,500,000	1,650,000							3,820,000	1,649,500	5.6	3,299,500	58,920	68
100,000	87,500							75,000	75,000	5	162,500	26,596	69
100,000	50,000							60,000	45,000	5.6	95,000	25,000	70
1,250,000	1,250,000							1,250,000	750,000	5.6	2,000,000	65,359	71
160,000	160,000										160,000	13,190	72
400,000	400,000	5	20,000					150,000	149,800	5	549,800		73
1,000,000	1,000,000	3	30,000					500,000	445,000	6	1,445,000		73a
100,000	100,000	7 1/2	7,600					25,000	25,000	5	125,000		73b
400,000	350,000	12	42,000					115,000	115,000	5	465,000		73c
75,000	73,700	7	5,019					75,000	73,700	5	147,700		73d
500,000	500,000							400,000	330,000	5	830,000		73e
130,000	130,000	12	15,600					100,000	100,000	5	230,000		73f
200,000	200,000	2	4,000					150,000	150,000	6	350,000	38,419	74
100,000	100,000							100,000	100,000	4	200,000	22,989	75
100,000	100,000							100,000	99,400	4	199,400	24,925	76
6,000,000	3,000,000							4,000,000	2,850,000	5.6	5,850,000		77
450,000	450,000							150,000	450,000	5.6	900,000		77a
400,000	400,000							200,000	115,000	6	515,000	106,774	77b
75,000	60,000										60,000		77c
500,000	500,000							150,000	150,000	6	650,000		77d
1,050,000	976,125							525,000	355,500	6	1,331,625		77e
500,000	500,000			\$200,000	\$200,000			500,000	300,000	4	1,000,000		78
60,000	60,000							60,000	60,000	4	120,000	57,881	78a
60,000	60,000							60,000	60,000	5	120,000	37,500	79
51,200	51,200							15,000	7,000	4	58,200	21,161	80
125,000	125,000							125,000			125,000	32,051	81
200,000	200,000	5	10,000					200,000	200,000	5	400,000	27,341	82
100,000	50,000							100,000	100,000	6	150,000	22,693	83
100,000	100,000							100,000	100,000	6	200,000	16,667	84
200,000	150,000							200,000	200,000	5	350,000	17,500	85
125,000	125,000							125,000	125,000	5	250,000	76,687	86
60,000	60,000							84,000	34,000	5	94,000	16,041	87
5,043,050	5,043,050	4 1/2	212,500					2,187,000	2,187,000	5	7,230,050	108,592	88
200,000	200,000	4	8,000					150,000	150,000	5	350,000	26,923	89
200,000	101,700							100,000	100,000	6	201,700	58,127	90
25,000	25,000							25,000	25,000	6	50,000	27,027	91
600,000	338,550							169,000	169,000	6	507,550	58,744	92
50,000	18,000							50,000	18,000	6	36,000	14,694	93
24,000	800										900	400	94
100,000	100,000							100,000	100,000	6	200,000	33,389	95
50,000	50,000	2	1,000								50,000	6,305	96
60,000	60,000	11 1/2	6,600								60,000	9,554	97
200,000	200,000	3	6,000					150,000	150,000	5	350,000	28,571	98
16,475,000	16,375,000		760,000					9,900,000	6,221,200		11,22,586,200	75,979	1
700,000	700,000							1,000,000	500,000	5	1,200,000	63,559	2
500,000	500,000	8	40,000								500,000	25,368	3
9,000,000	9,000,000	8	720,000					3,000,000	25,000	1	9,025,000	63,852	3

† Includes \$43,050, stocks of subsidiary companies outstanding.

‡ Includes \$370,000, bonds of subsidiary companies outstanding.

§ Road under construction.

|| Exclusive of 11.72 miles lying outside of state, but including 25.74 miles in state owned by outside companies. Total owned by companies in state, 328.90 miles total operated, 336.33 miles.

|| Capital reported for 7 companies only, representing 297.40 miles of track owned. (See note 2, page 270.)

|| See Old Colony Railway Company, Massachusetts.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
RHODE ISLAND—Continued.								
4	Providence, Bristol, East Greenwich and vicinity.	Rhode Island Suburban Rwy. Co.	Apr. 1, 1901	Mar. 31, 1902	68.07	68.07	\$5,000,000	\$5,000,000
5	Providence, Scituate, Foster	Providence and Danielson Rwy. Co.	July 1, 1901	June 30, 1902	25.12	28.52	800,000	800,000
6	Providence, Warren, Bristol	New York, New Haven and Hartford R. Co. (Providence, Warren and Bristol Branch.)	July 1, 1901	June 30, 1902	131.50	131.50	(?)	(?)
7	Westerly	Pawcatuck Valley Street Rwy. Co.	July 1, 1901	June 30, 1902	6.23	6.23	75,000	75,000
8	Woonsocket, Manville; Blackstone (Mass.).	Woonsocket Street Rwy. Co.	Oct. 1, 1901	Sept. 30, 1902	22.34	22.34	400,000	300,000
SOUTH CAROLINA.								
Total for state					76.98	77.98	2,891,400	2,569,400
1	Augusta (Ga.), North Augusta.	North Augusta Electric and Improvement Co.	Jan. 1, 1901	Dec. 31, 1901	2.38	3.38	16,400	16,400
2	Charleston	Charleston Consolidated Railway, Gas and Electric Co.	Mar. 1, 1901	Feb. 28, 1902	34.42	34.42	1,500,000	1,500,000
3	Columbia	Columbia Electric Street Railway, Light and Power Co.	Jan. 1, 1902	Dec. 31, 1902	14.00	14.00	350,000	350,000
4	Greenville.	Greenville Traction Co.	Jan. 1, 1902	Dec. 31, 1902	7.00	7.00	500,000	306,000
5	Orangeburg	Orangeburg City Street Rwy. Co.	July 1, 1901	June 30, 1902	1.87	1.87	25,000	10,000
6	Rock Hill	Rock Hill Water Supply, Electric Light and Street Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	1.31	1.31	100,000	7,000
7	Spartanburg, Glendale, Clifton	Spartanburg Railway, Gas and Electric Co.	Jan. 1, 1902	Dec. 31, 1902	16.00	16.00	400,000	400,000
SOUTH DAKOTA.								
Total for state					2.00	2.00	100,000	100,000
1	Rapid City	Rapid City Street Rwy. Co. ⁷			2.00	2.00	100,000	100,000
TENNESSEE.								
Total for state					248.53	248.53	13,725,000	8,160,400
1	Bristol	Bristol Belt Line Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	4.25	4.25	100,000	100,000
2	Chattanooga and vicinity	Chattanooga Electric Rwy. Co.	July 1, 1901	June 30, 1902	38.38	38.38	645,000	645,000
3	Chattanooga	Rapid Transit Co. of Chattanooga ¹¹	July 1, 1901	June 30, 1902	38.50	38.50	5,000,000	500,000
4	Clarksville	Electric Street Railway of Clarksville	Jan. 1, 1902	Dec. 31, 1902	5.50	5.50	20,000	20,000
5	Jackson	Jackson and Suburban Street R. R. Co.	Jan. 1, 1902	Dec. 31, 1902	3.19	3.19	100,000	65,400
6	Knoxville and vicinity	Knoxville Traction Co.	July 1, 1901	June 30, 1902	26.00	26.00	860,000	860,000
7	Memphis	Memphis Street Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	71.88	71.88	500,000	500,000
8	Nashville and vicinity	Nashville Rwy. Co.	July 1, 1901	June 30, 1902	66.50	66.50	6,500,000	5,470,000
TEXAS.								
Total for state					1303.28	1309.36	9,831,000	9,150,900
1	Austin	Austin Electric Rwy. Co.	July 1, 1901	June 30, 1902	13.38	13.38	200,000	200,000
2	Bonham	Bonham Electric Railway, Light and Power Co.	July 1, 1901	June 30, 1902	2.63	2.63	25,000	25,000
3	Dallas	Dallas Consolidated Electric Street Rwy. Co.	July 1, 1901	June 30, 1902	34.64	34.64	2,000,000	2,000,000
4	Dallas and vicinity	Rapid Transit Rwy. Co.	July 1, 1901	June 30, 1902	11.66	13.00	100,000	48,000
5	Denison, Sherman	Denison and Sherman Rwy. Co.	July 1, 1901	June 30, 1902	16.20	16.20	200,000	100,000
6	El Paso	El Paso Electric Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	13.48	13.48	750,000	750,000
7	Fort Worth, Dallas	Northern Texas Traction Co.	July 1, 1901	June 30, 1902	61.70	61.70	2,500,000	2,000,000
8	Galveston	Galveston Street Rwy. Co.	July 1, 1901	June 30, 1902	35.86	35.86	800,000	800,000
9	Houston	Houston Electric Co.	July 1, 1901	June 30, 1902	37.20	37.20	2,500,000	2,500,000
10	Laredo	Laredo Electric and Rwy. Co.	July 1, 1901	June 30, 1902	2.85	2.85	60,000	60,000
11	Longview	Longview and Junction Rwy. Co.	July 1, 1901	June 30, 1902	.63	.63	5,000	5,000
12	Paris	Paris Transit Co.	Dec. 4, 1901	June 30, 1902	5.00	5.00	100,000	100,000
13	San Antonio	San Antonio Traction Co.	July 1, 1901	June 30, 1902	45.51	45.51	200,000	200,000
14	Seguin	Seguin Street Rwy. Co.	July 1, 1901	June 30, 1902	1.50	1.50	6,000	6,000
15	Waco	Citizens Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	16.29	16.29	350,000	350,000
16	Waxahachie	Waxahachie Street Rwy. Co.	July 1, 1901	June 30, 1902	2.71	4.74	25,000	1,000
17	do	Lake Park Street R. R. Co.	July 1, 1901	June 30, 1902	2.03	4.74	10,000	5,900
UTAH.								
Total for state					89.04	89.04	4,150,000	3,110,000
1	Ogden	Ogden Rapid Transit Co.	July 1, 1901	June 30, 1902	11.00	11.00	100,000	60,000
2	Salt Lake City, Murray, Fort Douglas	Consolidated Railway and Power Co.	Oct. 1, 1901	Sept. 30, 1902	75.00	75.00	4,000,000	3,000,000
3	Salt Lake City and vicinity	Salt Lake and Utah Valley Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	3.04	3.04	50,000	50,000

¹ Includes 8.5 miles in Massachusetts.² Capitalization included in that of steam railroad.³ Includes 3.22 miles in Massachusetts.⁴ Includes electric-light plant and other investments.⁵ Cash investment.⁶ Includes electric-light plant.⁷ This company failed to make a report; the information given was obtained from street-railway journals and directories.⁸ Exclusive of 5.67 miles lying outside of state. Total owned and operated by companies in state, 254.20 miles.⁹ Exclusive of \$582,015, investments other than street railways and electric-light plants owned.

GENERAL TABLES.

271

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.				Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest per cent.				
Par value.		Dividends.		Par value.		Dividends.								
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.							
\$5,000,000	\$5,000,000							\$5,000,000	\$4,816,200	4	\$9,816,200	\$144,207	4	
800,000	800,000							600,000	600,000	5	1,400,000	55,732	5	
75,000	75,000							100,000	100,000	5	175,000	28,090	7	
400,000	300,000							200,000	180,000	5	480,000	21,486	8	
2,791,400	2,489,400		\$720	\$100,000	\$100,000			3,650,000	3,336,000		\$5,925,400	76,973		
16,400	16,400										16,400	6,591	1	
1,500,000	1,500,000							2,500,000	2,500,000	5	\$4,000,000	116,212	2	
250,000	250,000			100,000	100,000			500,000	320,000	5	\$670,000	47,857	3	
300,000	306,000							250,000	186,000	5	492,000	70,286	4	
25,000	10,000	7½	720								10,000	5,248	5	
100,000	7,000										7,000	5,344	6	
400,000	400,000							400,000	330,000	5	\$730,000	45,625	7	
100,000	100,000										100,000	50,000		
100,000	100,000										100,000	50,000	1	
13,725,000	8,160,400							14,240,000	8,686,400		16,846,800	263,984		
100,000	100,000							75,000	75,000	5	175,000	41,176	1	
645,000	645,000							625,000	625,000	5	1,270,000	33,090	2	
5,000,000	500,000							770,000	770,000	5,6	1,270,000	32,967	3	
20,000	20,000							30,000	28,900	6	1,248,900	8,891	4	
100,000	65,400							90,000	67,500	6	\$132,900	41,661	5	
860,000	860,000							1,150,000	1,150,000	5,6	\$2,010,000	77,306	6	
500,000	500,000							5,000,000	3,910,000	5,6	4,410,000	61,352	7	
6,540,000	5,470,000							6,500,000	2,060,000	5,6	7,530,000	113,233	8	
8,431,000	7,750,900		14,500	1,400,000	1,400,000		\$8,100	6,530,000	3,952,900		\$13,103,800	43,206		
200,000	200,000										200,000	14,948	1	
25,000	25,000		2,000					10,000	10,000	6	35,000	13,308	2	
1,500,000	1,500,000			500,000	500,000	1½	8,100	2,000,000	665,000	5	2,665,000	77,512	3	
100,000	48,000							100,000	48,000	5	96,000	5,233	4	
200,000	100,000							500,000	300,000	5	400,000	24,691	5	
750,000	750,000	1½	12,500								750,000	55,638	6	
2,500,000	2,000,000							50,000	50,000	5	2,050,000	32,225	7	
400,000	400,000			400,000	400,000			600,000	600,000	5	1,400,000	39,041	8	
2,000,000	2,000,000			500,000	500,000			2,500,000	1,500,000	5	4,000,000	107,527	9	
60,000	60,000										60,000	21,053	10	
5,000	5,000										5,000	7,937	11	
100,000	100,000							100,000	100,000	5	200,000	40,000	12	
200,000	200,000							300,000	300,000		500,000	10,987	13	
6,000	6,000										6,000	4,000	14	
350,000	350,000							350,000	350,000	6	\$700,000	42,971	15	
25,000	1,000							10,000	4,000	5	5,000	1,845	16	
16,000	5,900							10,000	5,900	5	11,900	5,813	17	
4,150,000	3,110,000		3,000					3,100,000	2,900,000		\$5,910,000	66,375		
100,000	60,000	5	3,000					100,000	100,000	5	160,000	14,545	1	
1,000,000	3,000,000							3,000,000	2,700,000	5	\$5,700,000	76,000	2	
50,000	50,000										50,000	16,447	3	

* Includes .67 mile in Virginia.
 † Report furnished by United Railways, Light and Water Company of Philadelphia, Pa., and includes North Side Consolidated Street Railway, Chattanooga and Lookout Mountain Railway, and Lookout Point Incline Company.
 ‡ Includes 5 miles in Georgia.
 § Includes investments other than street railways.
 ¶ Exclusive of 1.15 miles lying outside of state, but including 1.10 miles in state owned by outside companies. Total owned by companies in state, 363.27 miles; total operated, 369.35 miles.
 † Includes 1.15 miles in Mexico.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.	
			From—	To—	Owned.	Operated.	Total par value.	
							Authorized.	Issued.
VERMONT.								
Total for state					186.05	186.05	\$1,885,000	\$1,835,100
1	Barre, Montpelier	Barre and Montpelier Power and Traction Co.	July 1, 1901	June 30, 1902	8.82	8.82	150,000	130,000
2	Bellows Falls, Saxtons Falls	Bellows Falls and Saxtons River R. R. Co.	Aug. 1, 1901	July 31, 1902	6.54	6.54	100,000	100,000
3	Brattleboro, West Brattleboro	Brattleboro Street Rwy. Co.	Aug. 1, 1901	July 31, 1902	5.00	5.00	75,000	55,500
4	Burlington, Winooski	Burlington Traction Co.	July 1, 1901	June 30, 1902	11.22	11.22	200,000	200,000
5	Rutland	Rutland Street Rwy. Co.	July 1, 1901	June 30, 1902	10.45	10.45	700,000	700,000
6	St. Albans, Swanton	St. Albans Street Rwy. Co.	July 1, 1901	June 30, 1902	13.50	13.50	200,000	200,000
7	Springfield; Charlestown (N. H.)	Springfield Electric Rwy. Co.	July 1, 1901	June 30, 1902	9.11	9.11	75,000	64,600
8	Waterbury, Stowe	Mt. Mansfield Electric Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	11.25	11.25	300,000	300,000
9	Winooski, Essex Junction	Military Post Street Rwy. Co.	July 1, 1901	June 30, 1902	4.66	4.66	85,000	85,000
VIRGINIA.								
Total for state					338.17	337.30	30,359,000	21,812,000
1	Charlottesville	Charlottesville City and Suburban Rwy. Co.	Sept. 1, 1901	Aug. 31, 1902	3.70	3.70	100,000	68,000
2	Danville	Danville Railway and Electric Co.	Nov. 1, 1901	Oct. 31, 1902	5.30	5.30	100,000	100,000
3	Falls Church, Arlington; Washington, (D. C.)	Washington, Arlington, and Falls Church Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	11.92	11.92	100,000	100,000
4	Lynchburg and vicinity	Lynchburg Traction and Light Co.	May 1, 1901	Apr. 30, 1902	15.50	15.50	1,000,000	750,000
5	Newport News	Citizens Railway, Light and Power Co.	June 1, 1901	May 31, 1902	4.87	9.53	200,000	200,000
6	Newport News, Hampton, Phoebus, Old Point Comfort	Newport News and Old Point Railway and Electric Co.	June 1, 1901	May 31, 1902	35.00	39.87	1,800,000	1,800,000
7	Norfolk and vicinity	Bay Shore Terminal Co.	May 23, 1902	June 30, 1902	12.00	12.00	500,000	100,000
8	Norfolk, Sewall Point	Norfolk and Atlantic Terminal Co.	June 1, 1901	May 31, 1902	19.04	19.04	5,000,000	500,000
9	Norfolk, Berkley	Berkley Street Rwy. Co.	Mar. 1, 1902	June 1, 1902	14.01	14.27	100,000	100,000
10	Norfolk, Berkley, Ocean View	Norfolk Railway and Light Co.	June 1, 1901	May 31, 1902	53.03	53.03	1,650,000	1,650,000
11	Petersburg	Southside Railway and Development Co.	July 1, 1901	June 30, 1902	10 12.85	10 12.85	(11)	(11)
12	Petersburg, Manchester	Richmond and Petersburg Electric Rwy. Co.	Feb. 20, 1902	June 30, 1902	21.93	23.08	1,000,000	600,000
13	Portsmouth	Old Dominion Rwy. Co.	July 1, 1901	June 30, 1902	12.21	12.21	12 2,000,000	12 535,000
14	do	Norfolk, Portsmouth and Newport News Co.	June 1, 1901	May 31, 1902	8.63	8.63	550,000	550,000
15	Radford	Radford Water Power Co.	Oct. 26, 1901	Oct. 25, 1902	2.98	2.98	50,000	50,000
16	Richmond	Richmond Traction Co.	July 1, 1901	June 30, 1902	18.75	23.71	(11)	(11)
17	do	Richmond Passenger and Power Co.	July 1, 1901	June 30, 1902	25.21	27.33	(11)	(11)
18	Richmond, Petersburg, Manchester	Virginia Passenger and Power Co. (including West Hampton Park Rwy. Co.)	Apr. 1, 1902	Mar. 31, 1903	37.60	37.60	15 15,000,000	15 14,000,000
19	Roanoke, Salem, Vinton	Roanoke Railway and Electric Co.	Jan. 1, 1902	Dec. 31, 1902	19.04	19.04	200,000	200,000
20	Tazewell	Tazewell Street Rwy. Co.	Mar. 1, 1901	Feb. 28, 1902	2.00	2.00	9,000	9,000
21	Washington (D. C.), Alexandria, Mt. Vernon	Washington, Alexandria and Mt. Vernon Rwy. Co.	June 1, 1901	May 31, 1902	10 23.73	10 25.84	1,000,000	500,000
WASHINGTON.								
Total for state					228.93	228.93	11,115,000	11,036,400
1	Everett, Lowell	Everett Railway and Electric Co.	Sept. 1, 1901	Aug. 31, 1902	9.65	9.65	200,000	200,000
2	Olympia, Turnwater	Olympia Light and Power Co.	Oct. 1, 1901	Sept. 30, 1902	4.18	4.18	165,200	163,200
3	Seattle, Ballard, Georgetown, South Park	Seattle Electric Co.	July 1, 1901	June 30, 1902	83.19	83.19	8,000,000	8,000,000
4	Seattle, Renton	Seattle and Renton Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	13.25	13.25	100,000	100,000
5	Spokane	Washington Water Power Co.	Jan. 1, 1901	Dec. 31, 1901	33.40	33.40	400,000	400,000
6	do	Spokane and Montrose Motor R. R. Co.	Jan. 1, 1902	Dec. 31, 1902	3.15	3.15	50,000	50,000
7	Tacoma, Spanaway	Tacoma Railway and Power Co.	July 1, 1901	June 30, 1902	69.11	69.11	2,000,000	2,000,000
8	Whatcom, Fairhaven, Silver Beach	Northern Railway and Improvement Co.	Sept. 1, 1901	Aug. 31, 1902	13.00	13.00	200,000	123,200
WEST VIRGINIA.								
Total for state					193.08	193.64	4,924,500	4,273,600
1	Charleston	Kanawha Valley Traction Co.	Jan. 1, 1902	Dec. 31, 1902	7.14	7.14	100,000	5,000
2	Chester; East Liverpool (Ohio)	East Liverpool and Rock Springs Street Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	19 3.26	19 3.82	150,000	150,000
3	Fairmont, Clarksburg	Fairmont and Clarksburg Electric Rwy. Co.	Dec. 1, 1901	Nov. 30, 1902	7.10	7.10	1,000,000	750,000
4	Huntington; Ashland (Ky.); Hanging Rock (Ohio)	Camden Interstate Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	29 30.23	29 30.23	1,000,000	1,000,000
5	Parkersburg, Williamstown; Marietta (Ohio)	Parkersburg, Marietta and Interurban Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	21 29.50	21 29.50	500,000	440,000
6	Wellsburg	Wheeling and Wellsburg Rwy. Co.	Dec. 1, 1901	Nov. 30, 1902	1.77	1.77	24,500	24,500
7	Wheeling, Moundsville; Martins Ferry, Bridgeport, Bellaire, Steubenville, Mingo (Ohio)	Wheeling Traction Co.	Jan. 1, 1902	Oct. 31, 1902	24 44.75	24 44.75	2,000,000	1,836,300
8	Wheeling, Elm Grove	Wheeling and Elm Grove Rwy. Co.	Dec. 1, 1901	Nov. 30, 1902	16.25	16.25	150,000	67,800

¹ Exclusive of 2.75 miles lying outside of state, but including 8.25 miles in state owned by outside companies. Total owned and operated by companies in state, 80.55 miles.

² Includes 2.75 miles in New Hampshire.

³ Exclusive of 1.80 miles lying outside of state, but including .67 mile in state owned by outside companies. Total owned by companies in state, 359.30 miles.

⁴ Including 3.51 miles leased from steam railroad (see note 10); total operated, 379.43 miles.

⁵ Exclusive of \$3,284,535, investments other than street railways and electric-light plants owned.

⁶ Includes electric-light plant and other investments.

⁷ Exclusive of \$548,881, investments other than street railways and electric-light plants owned.

⁸ Exclusive of \$324,583, investments other than street railways and electric-light plants owned.

⁹ 24 per cent on \$600,000 for first dividend, and 24 per cent on \$725,000 for second dividend.

¹⁰ Includes investments other than street railways.

¹¹ Includes 3.51 miles leased from steam railroad.

¹² Included in report of Virginia Passenger and Power Company. (See note 15.)

GENERAL TABLES.

273

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.					Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount out-standing.	Rates of interest, per cent.					
Par value.		Dividends.		Par value.		Dividends.									
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.								
\$1,870,000	\$1,820,100	.....	\$8,000	\$15,000	\$15,000	.....	\$750	\$1,450,000	\$931,600	.....	\$2,786,700	\$34,345			
150,000	130,000	.....				.....		100,000	100,000	5	230,000	26,077	1		
100,000	100,000	.....				.....		75,000	75,000	5	175,000	26,758	2		
75,000	55,500	.....				.....		25,000	25,000	5	80,500	16,100	3		
200,000	200,000	4	8,000			.....		150,000	125,000	6	325,000	28,966	4		
700,000	700,000	.....				.....		500,000	81,600	5	781,600	74,794	5		
200,000	200,000	.....				.....		200,000	150,000	5	350,000	25,926	6		
75,000	64,600	.....				.....		100,000	100,000	5	164,600	18,068	7		
300,000	300,000	.....				.....		225,000	200,000	5	500,000	44,444	8		
70,000	70,000	.....		15,000	15,000	5	750	75,000	75,000	6	160,000	34,335	9		
24,684,000	17,087,000	.....	270	5,725,000	4,725,000	.....	33,125	30,167,000	25,891,314	.....	47,703,314	4124,845			
100,000	68,000	.....				.....		150,000	133,314	6	5201,314	54,409	1		
100,000	100,000	.....				.....		235,000	235,000	5	335,000	63,208	2		
100,000	100,000	.....				.....		100,000	100,000	6	200,000	16,779	3		
1,000,000	750,000	.....				.....		1,000,000	750,000	5	51,500,000	461,362	4		
200,000	200,000	.....				.....		800,000	751,000	5	3951,000	7128,628	5		
1,075,000	1,075,000	.....		725,000	725,000	5	33,125	4,000,000	2,400,000	5	54,200,000	120,000	6		
500,000	100,000	.....				.....		500,000	125,000	5	225,000	18,750	7		
5,000,000	500,000	.....				.....		500,000	500,000	5	51,000,000	52,521	8		
100,000	100,000	.....				.....		500,000	500,000	5	600,000	42,827	9		
1,650,000	1,650,000	.....				.....		4,000,000	3,235,000	5,6	54,885,000	92,118	10		
1,000,000	600,000	.....				.....		(11)	(11)				11		
2,000,000	535,000	.....				.....		1,000,000	500,000	5	1,100,000	50,160	12		
550,000	550,000	.....				.....		12,542,000	12,542,000	5,6	1,077,000	88,208	13		
50,000	50,000	.....				.....		500,000	500,000	5	1,050,000	40,900	14		
		.....				.....		100,000	100,000	5	150,000	50,336	15		
		.....				.....		(11)	(11)				16		
10,000,000	10,000,000	.....		5,000,000	4,000,000	.....		15,000,000	14,330,000	.....	1528,330,000	311,661	17		
200,000	200,000	.....				.....		490,000	490,000	4,5	1690,000	36,239	19		
9,000	9,000	3	270			.....		750,000	700,000	5	9,000	4,500	20		
1,000,000	500,000	.....				.....					1,200,000	50,569	21		
5,115,000	5,026,100	.....	37,528	5,000,000	3,000,000	.....	112,500	9,290,000	7,747,813	.....	518,784,213	82,052			
200,000	200,000	.....				.....		1,000,000	500,000	5	14700,000	72,539	1		
165,000	163,200	4	6,528			.....					14163,200	39,043	2		
5,000,000	5,000,000	.....		3,000,000	3,000,000	6	112,500	5,500,000	5,018,000	5	1413,018,000	156,485	3		
100,000	100,000	11	11,000			.....		150,000	65,000	5	165,000	12,453	4		
400,000	400,000	5	20,000			.....		800,000	600,000	5	51,000,000	29,940	5		
50,000	50,000	.....				.....		40,000	40,000	6	90,000	28,571	6		
2,000,000	2,000,000	.....				.....		1,700,000	1,424,813	5,6	3,424,813	49,556	7		
200,000	123,200	.....				.....		100,000	100,000	5	223,200	17,169	8		
1,524,500	4,273,600	.....	22,000			.....		5,600,000	5,308,400	.....	29,582,000	68,443			
100,000	5,000	.....				.....		200,000	200,000	5	205,000	28,711	1		
150,000	150,000	.....				.....		150,000		6	150,000	46,012	2		
1,000,000	750,000	.....				.....		1,000,000	200,000	5	1950,000	133,803	3		
1,000,000	1,000,000	.....				.....		1,500,000	1,440,000	5,6	2,440,000	80,715	4		
500,000	440,000	5	22,000			.....		1,000,000	600,000	5,6	11,040,000	35,254	5		
24,500	24,500	.....				.....					24,500	13,842	6		
2,000,000	1,836,300	.....				.....		2,500,000	2,154,000	5,6	5,930,300	89,189	7		
150,000	67,800	.....				.....		1,250,000	714,400	5	5782,200	68,135	8		

¹² Not reported; obtained from street-railway journals and directories.

¹³ Exclusive of \$297,031, investments other than street railways.

¹⁴ Includes electric-light plant.

¹⁵ Issued after combination with Southside Railway and Development Company, Richmond Traction Company, and Richmond Passenger and Power Company, subsequent to period covered by Census report; total trackage owned 90.90 miles; also includes electric-light plants.

¹⁶ Includes 1.80 miles in District of Columbia.

¹⁷ Total amount of stock shown was not issued until near the end of the year reported.

¹⁸ Exclusive of 46.92 miles lying outside of state. Total owned by companies in state, 140 miles; total operated, 140.56 miles.

¹⁹ Includes .89 mile in Ohio.

²⁰ Includes 6.87 miles in Kentucky, and 9.16 miles in Ohio.

²¹ Includes 8 miles in Ohio.

²² Cash investment.

²³ Includes 22 miles in Ohio.

STREET AND ELECTRIC RAILWAYS.

TABLE 93.—NAME, LOCATION, LENGTH OF TRACK, CAPITAL.

Number.	STATE AND LOCATION.	Name of company.	PERIOD COVERED BY REPORT.		LENGTH, SINGLE-TRACK MILES.		CAPITAL STOCK.			
			From—	To—	Owned.	Operated.	Total par value.			
							Authorized.	Issued.		
WISCONSIN.										
Total for state							1446.14	1446.14	\$23,344,000	\$15,178,000
1	Appleton, Kaukauna, Menasha, Neenah.	Wisconsin Traction, Light, Heat and Power Co.	Jan. 1, 1902	Sept. 30, 1902	19.25	19.25			1,000,000	1,000,000
2	Ashland.	Ashland Light, Power and Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	7.68	7.68			84,000	84,000
3	Eau Claire, Chippewa Falls.	Chippewa Valley Electric R. R. Co.	Jan. 1, 1902	Dec. 31, 1902	22.57	22.57			200,000	200,000
4	Fond du Lac.	Fond du Lac Street Rwy. and Light Co.	Jan. 1, 1901	Dec. 31, 1901	6.27	6.27			150,000	150,000
5	Green Bay and vicinity.	Fox River Electric Railway and Power Co.	Jan. 1, 1902	Dec. 31, 1902	17.13	17.13			150,000	145,500
6	Janesville.	Janesville Street Rwy. Co.	Jan. 1, 1901	Dec. 31, 1901	7.41	7.41			50,000	50,000
7	La Crosse.	La Crosse City Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	14.44	14.44			200,000	200,000
8	La Crosse, Onalaska.	La Crosse and Onalaska Street Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	2.67	2.67			50,000	38,000
9	Madison, Blooming Grove.	Madison Traction Co.	Sept. 1, 1901	Aug. 31, 1902	8.50	8.50			200,000	200,000
10	Manitowoc, Two Rivers.	Manitowoc and Northern Traction Co.	May 1, 1902	Dec. 31, 1902	8.63	8.63			100,000	100,000
11	Marinette.	Marinette Gas, Electric Light and Street Rwy. Co.	May 1, 1901	Apr. 30, 1902	5.40	5.40			115,000	115,000
12	Merrill.	Merrill Railway and Lighting Co.	Jan. 1, 1902	Dec. 31, 1902	1.55	1.55			20,000	20,000
13	Milwaukee, Whitefish Bay, Wauwatosa.	Milwaukee Electric Railway and Light Co.	Jan. 1, 1902	Dec. 31, 1902	145.50	145.50			19,500,000	11,500,000
14	Milwaukee, Racine, Waukesha, Pewaukee.	Milwaukee Light, Heat and Traction Co.	Jan. 1, 1902	Dec. 31, 1902	92.56	92.56			500,000	500,000
15	Oshkosh, Neenah.	Winnebago Traction Co.	Apr. 1, 1901	Mar. 31, 1902	32.00	32.00			650,000	650,000
16	Sheboygan, Sheboygan Falls.	Sheboygan Light, Power and Rwy. Co.	July 1, 1901	June 30, 1902	20.00	20.00			300,000	151,100
17	Waupaca.	Waupaca Electric Light and Rwy. Co.	Jan. 1, 1902	Dec. 31, 1902	4.94	4.94			75,000	75,000
HAWAII.										
Total for territory							28.70	28.70	1,775,000	1,450,000
1	Honolulu.	Hawaiian Tramways Co.	July 1, 1901	June 30, 1902	12.00	12.00			650,000	325,000
2	do.	Honolulu Rapid Transit and Land Co.	Jan. 1, 1902	Dec. 31, 1902	14.20	14.20			1,000,000	1,000,000
3	do.	Pacific Heights Electric Rwy. Co. (Ltd)	Jan. 4, 1902	Dec. 31, 1902	2.50	2.50			125,000	125,000
PORTO RICO.										
Total							12.56	12.56	648,000	571,340
1	Mayaguez.	Tramway Stock Co.	July 1, 1901	June 30, 1902	3.13	3.13			48,000	27,840
2	San Juan, Rio Piedras.	San Juan Light and Transit Co.	Jan. 1, 1902	Dec. 31, 1902	9.43	9.43			600,000	543,500

¹Includes 29.64 miles in state owned by outside companies. Total owned and operated by companies in state, 416.50 miles.

²Exclusive of \$708,756, investments other than street railways and electric-light plants owned.

³Includes electric-light plant.

GENERAL TABLES.

275

STOCK, AND FUNDED DEBT, BY COMPANIES: 1902—Continued.

CAPITAL STOCK—continued.								FUNDED DEBT.			Total capital stock and funded debt outstanding.	Capital liabilities per mile of single track owned.	Number.
Common.				Preferred.				Amount authorized.	Amount outstanding.	Rates of interest, per cent.			
Par value.		Dividends.		Par value.		Dividends.							
Authorized.	Issued.	Rate per cent.	Amount.	Authorized.	Issued.	Rate per cent.	Amount.						
\$18,719,000	\$10,553,700		\$30,563	\$4,625,000	\$4,624,900		\$270,000	\$28,281,400	\$13,058,350		\$28,286,950	\$366,094	
1,000,000	1,000,000							1,000,000	750,000	5	\$1,750,000	90,909	1
84,000	84,000							78,400	59,300	5	\$143,300	18,659	2
200,000	200,000							200,000	200,000	6	400,000	17,723	3
150,000	150,000							250,000	250,000	5	\$400,000	63,796	4
25,000	20,600			125,000	124,900			150,000	120,050	5	\$265,550	15,502	5
50,000	50,000							75,000	75,000	6	125,000	16,869	6
200,000	200,000							136,000	136,000	6	336,000	23,269	7
50,000	38,000										38,000	14,232	8
200,000	200,000	5	10,000					300,000	200,000	5	400,000	47,059	9
100,000	100,000							100,000	100,000	5	200,000	23,175	10
115,000	115,000							50,000	30,000	6	\$145,000	26,852	11
20,000	20,000							100,000			\$20,000	12,903	12
15,000,000	7,000,000			4,500,000	4,500,000	6	270,000	19,500,000	8,000,000	5	\$19,500,000	134,021	13
500,000	500,000	4	20,563					5,000,000	2,249,000	5	\$2,749,000	29,700	14
650,000	650,000							1,000,000	555,000	5	\$1,205,000	37,656	15
300,000	151,100							300,000	300,000	5	\$451,100	22,555	16
75,000	75,000							42,000	34,000	6	\$109,000	22,065	17
1,566,000	1,241,000		19,500	209,000	209,000			1,275,000	610,000		\$2,060,000	71,777	
650,000	325,000	6	19,500					150,000	150,000	6	\$475,000	39,563	1
791,000	791,000			209,000	209,000			1,000,000	460,000	6	1,460,000	102,817	2
125,000	125,000							125,000			125,000	50,000	3
648,000	571,340							611,800	553,600		\$1,125,140	89,561	
48,000	27,840							11,800	11,800	5	39,640	12,665	1
600,000	543,500							600,000	542,000	6	\$1,085,500	115,111	2

* Includes electric-light plant and other investments.

* Includes investments other than street railways.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for op-eration during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by com-pany.	Not owned by com-pany.
UNITED STATES		\$22,589.47	16,651.58	5,030.36	907.53	*21,302.57		\$1,027.80	259.10	19,038.33	3,561.14	560.92	1,549.73	3,424.96	377.11
ALABAMA.															
Total for state		204.72	167.70	21.75	15.27	173.69		28.00	3.03	204.72			4.50	70.08	.25
1	Anniston Electric and Gas.	10.00	9.50		.50	10.00				10.00			.50	1.50	
2	Birmingham Railway, Light and Power.	110.00	85.00	14.00	11.00	89.00	Steam	21.00		110.00			3.00	60.00	
3	Decatur Street Railway	3.03	3.00		.03				3.03	3.03					
4	Alabama City, Gadsden and Attalla	6.70	6.20		.50	6.70				6.70				3.00	
5	Huntsville Railway, Light and Power.	4.62	4.50		.12	4.62				4.62					.25
6	Mobile Light and Railroad	37.50	30.75	5.75	1.00	37.50				37.50				1.33	
7	Montgomery Street Railway	20.00	17.00	2.00	1.00	20.00				20.00					
8	Selma Street and Suburban	5.87	5.75		.12	5.87				5.87			1.00	.25	
9	Tuscaloosa Belt Railway	7.00	6.00		1.00		Steam	7.00		7.00				4.00	
ARIZONA.															
Total for territory		17.10	15.00	1.00	1.10	12.00			5.10	17.10				3.00	
1	Phoenix Railway	12.00	10.00	1.00	1.00	12.00				12.00				3.00	
2	Tucson Street Railway	5.10	5.00		.10				5.10	5.10					
ARKANSAS.															
Total for state		52.49	38.01	11.99	2.49	49.83			2.66	52.49			2.75	.50	.60
1	Citizens Electric	3.17	2.90		.27	3.17				3.17				.50	.60
2	Fort Smith Traction	7.57	6.00	1.51	.06	7.57				7.57			1.00		
3	Fort Smith and Van Buren	1.36	1.36			1.36				1.36					
4	Hot Springs Street Railroad	9.28	4.82	4.34	.12	9.28				9.28					
5	Little Rock Traction and Electric	20.70	13.43	6.14	1.13	20.70				20.70					
6	Citizens Light and Transit	7.75	7.00		.75	7.75				7.75			1.75		
7	Texarkana Railway	2.66	2.50		.16				2.66	2.66					
CALIFORNIA.															
Total for state		829.10	551.40	268.55	9.15	665.96		\$120.77	42.37	829.10		10.85	83.59	74.48	1.98
1	Bakersfield and Kern Electric	2.15	2.08		.07	2.15				2.15					
2	Fresno, Belmont and Yosemite	2.50	2.50						2.50	2.50					
3	Fresno Railroad	2.90	2.75		.15					2.90				1.75	
4	Nevada County Traction	5.10	5.00		.10	5.10				5.10				3.84	
5	Los Angeles Electric Incline	.14	.07	.07			Cable	.14		.14			.14		
6	Los Angeles Railway	94.82	55.82	39.00		94.82				94.82		1.89	1.67		
7	Los Angeles and Pasadena	31.86	20.46	9.85	1.55	31.86				31.86		1.88	.29	1.64	
8	Los Angeles Pacific Railway	87.48	62.57	24.91		87.48	Steam	15.07	5.95	87.48			51.00	55.80	
9	Pacific Electric Railway	11.34	8.52	2.82		11.34	Cable	109.16		11.34		.34			
10	Los Angeles Traction	26.00	26.00			26.00				26.00		3.00	.35		
11	Marysville and Yuba City	4.23	4.13		.10				4.23	4.23					
12	Monrovia Street Railway	1.50	1.50						1.50	1.50					
13	Monterey and Pacific Grove	4.15	4.00		.15				4.15	4.15				.20	
14	Oakland Transit Consolidated	122.80	76.16	45.21	*1.43	121.80			1.00	122.80			4.13	2.06	
15	Ontario and San Antonio Heights	8.00	7.75		.25	8.00				8.00					
16	Pasadena and Mt. Lowe	6.64	5.83		.81	6.12	Cable	.52		6.64				5.42	
17	Paso Robles Street Car	2.50	2.50						2.50	2.50					
18	Petaluma Street Railway	1.81	1.75		.06				1.81	1.81					
19	Pomona Street Railway	2.56	2.50		.06		Steam	2.56		2.56					.25
20	Redlands Street Railway	7.27	7.18		.09	7.27				7.27			2.40	.27	1.73
21	Riverside and Arlington	9.52	9.19		.33	9.52				9.52					
22	Sacramento Electric, Gas and Rwy.	23.50	13.73	8.31	1.46	23.50				23.50					
23	San Bernardino Valley	7.62	7.50		.12	7.62				7.62			7.50	.50	
24	San Diego Electric Railway	16.60	11.64	4.96		16.60				16.60					
25	Geary Street, Park and Ocean	7.68	3.84	3.84			Cable	7.68		7.68			.74		
26	California Street Cable	10.86	5.38	5.38	.10		Cable	10.86		10.86					
27	Presidio and Ferries	9.01	4.92	4.08	.01		Cable	127.25	1.76	9.01					
28	United Railroads of San Francisco	248.95	140.41	107.63	.91	177.53	Cable	1367.53	3.89	248.95			13.11		
29	San Jose Railroad	15.16	12.58	2.49	.09	15.16				15.16					
30	San Jose and Santa Clara	18.12	13.50	4.00	.62	18.12				18.12				1.50	
31	Santa Barbara Consolidated	8.50	8.00		.50	8.50				8.50					
32	Santa Cruz Electric	5.67	5.56		.11	5.67				5.67					
33	East Santa Cruz	2.85	2.80	.05					2.85	2.85				1.50	
34	Santa Rosa Street Railway	7.33	7.33						7.33	7.33					
35	Stockton Electric	11.98	5.95	5.95	.08	11.98				11.98					
COLORADO.															
Total for state		234.53	151.17	69.26	11.00	233.28			1.25	232.98	1.55		7.97	10.87	
1	Boulder Railway and Utility	4.08	4.00		.08	4.08				4.08			1.00	.04	
2	Colorado Springs and Cripple Creek	11.78	10.89		.89	11.78				11.78				10.03	
3	Colorado Springs Rapid Transit	29.01	20.86	6.77	1.38	29.01				27.46	1.55			.76	
4	Denver, Lakewood and Golden	6.00	5.00	1.00		6.00				6.00					
5	Denver City Tramway	143.77	85.89	49.84	8.04	143.77				143.77			4.52		
6	Durango Railway and Realty	2.39	2.28		.11	2.39				2.39					
7	Grand Junction (municipal)	1.25	1.25						1.25	1.25				.05	
8	Pueblo Traction and Lighting	36.25	24.00	11.75	.50	36.25				36.25			2.40	.04	

1 For details see Supplementary Table 1.

2 For feeder conduit system see Supplementary Table 2.

3 Includes 12.48 miles of track duplicated in reports of different companies. (See Illinois, New York, and Pennsylvania.)

4 Includes 21,088.42 miles of single trolley and 234.15 miles of double trolley construction; also 12.48 miles of track duplicated in reports of different companies.

5 Includes miles of track as follows: Cable, 240.69; compressed air, 6.06; conduit trolley, 266.06; steam, 169.61; storage batteries, 2.47; and third rail, 342.91.

6 Exclusive of Massachusetts, but including track outside city limits for 1 company in Kansas.

7 Exclusive of Massachusetts, but including track within city limits for 3 companies in Connecticut and 3 in Maine.

GENERAL TABLES.

277

CONSTRUCTION, BY COMPANIES: 1902.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.				BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.			
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi-Mini-mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground.	Number.
413,208.24	6,855.58	1,642.68			2,748	480,912	2,514	1,967	10,220.07	5,223.08	414.11		3,112.54	12,728.76	22,343.22	2,411.07	
124.60	80.12				29	2,836	10	67	113.63	21.82	2.25			137.70	178.17		
8.50	1.50		60	30	T, full groove.	9	476	3	7.00	2.50		42		9.50	16.00		1
50.00	60.00		80	60	Girder, half groove, T.	10	2,140	6	54.00	10.00		53		64.00	122.00		2
3.03			20	16	T			1									3
3.70	3.00		40	35	T	2	120	8	1.50	4.70		52		6.20	6.20		4
2.00	2.62		60	60	T	2	12	2	4.50			52		4.50	4.63		5
29.00	8.50		88	35	T, girder.	4	60	2	28.50		2.25	52		30.75	26.00		6
20.00			90	60	Groove, girder, T.			2	14.00	3.00		44		17.00	3.00		7
5.37	.50		45	35	T	3		3	4.13	1.62		48		5.75	.34		8
3.00	4.00		60	35	T	2	48	1									9
13.50	3.60				9	225		3	7.00	3.00			.50	9.50	4.00		
9.00	3.00		60	30	T	6	75	2	7.00	3.00		50	.50	9.50	4.00		1
4.50	.60		16	16	T	3	150	1									2
50.83	1.66				8	949	2	3	31.31	2.40	1.80		2.33	53.18	20.86		
3.07	.10		65	35	T				.50	2.40		65		2.90	1.25		1
7.52	.05		60	45	T, girder	1	24	1	4.80		1.20	52	.80	5.20	1.00		2
1.25	.11		60	56	T	1	20		1.36			48		1.86	.33		3
8.88	.40		45	25	T				4.22		.60	52		4.82	3.28		4
20.70			73	70	Girder, T	2	120	2	13.43			50	1.03	12.40	14.00		5
6.75	1.00		90	50	Girder, T	4	785	2	7.00			53	.50	6.50	1.00		6
2.66			30	20	T												7
667.20	161.90	110.62			57	11,913	47	65	339.82	58.39	24.44		101.33	321.32	255.48		
2.15			15	40	Girder.				2.08			52		2.08	3.50		1
2.50			20	20	T			1									2
1.00	1.90		20	20	T			2									3
1.25	3.85		70	70	T			1		5.00		50		5.00			4
.14			16	16	T												5
94.82		43.00	62	38	T, girder	4	4,400	20	55.82			48		55.82	50.00		6
28.37	3.49		60	40	T	5	2,445	3	11.71	8.75		50		20.46	25.00		7
21.61	65.87	2.66	60	40	T			1	12.78	15.65	20.65	50		49.08			8
7.22	4.12	1.00	65	25	T				2.18			50		2.18			9
26.00			70	60	T			2	(11)						12.00		10
1.72	2.51		22	16	T, girder			2									11
1.50			48	48	T			1									12
4.15			20	20	T												13
105.99	16.81	12.39	97	35	T, girder	2	816	11	66.43	8.73		45	52.11	23.05	71.08		14
1.75	6.25		30	30	T	2	200	2	6.00	1.75		50		7.75	2.25		15
	6.64		30	25	T	20	1,328			5.57		52		5.57	6.25		16
1.75	.75		15	15	T												17
1.81			38	38	Flat			1									18
2.56			25	25	T												19
6.91	.36		56	45	T	3	96	2	5.02	2.16		44		7.18	1.03		20
9.52			40	35	T	2	40		9.19			50		9.19	7.00		21
22.70	.80		51	25	T, girder	2	50		13.73			40		13.73	7.50		22
5.50	2.12		45	45	T	3	460		7.00	.50		44		7.50			23
15.60	1.00		60	30	Groove, girder			4	10.00	1.64		50		11.64	3.00		24
7.68			72	72	Girder.												25
10.86			38	38	Girder.												26
9.01			40	40	Flat, T												27
224.84	24.11	49.32	98	35	T, girder	4	625	9	98.66	2.27	3.79	50	49.22	55.50	53.06		28
10.72	4.44	2.25	42	35	T, girder			3	10.58	2.00		44		12.58	2.56		29
11.12	7.00		35	35	T	8	813		9.63	3.87		50		13.50	2.05		30
8.50			56	45	T			1	7.50	.50		50		8.00	6.00		31
5.67			40	40	T, girder				5.56			50		5.56	.50		32
2.00	.85		45	35	Flat	2	640										33
5.00	2.33		35	16	T, flat			2									34
5.28	6.70		40	40	Girder, T			1	5.95			53		5.95	2.70		35
213.93	20.60				26	8,094	12	11	140.16	12.76			5.20	117.72	214.43		
4.08			45	30	T			2	4.00			70		4.00	2.00		1
1.75	10.03		60	60	T	6	944		2.00	8.89		40		10.89	14.20		2
20.46	8.55		75	30	T	11	670	1	20.46			53	20	20.66	19.74		3
6.00			75	48	T	7	480	2	5.00			52		5.00			4
142.39	1.38		72	30	T, girder.	2	6,000	7	82.02	3.87		45	5.00	80.89	164.79		5
1.75	.64		30	30	T			1	2.28			52		2.28			6
1.25			30	30	T												7
36.25			80	30	T			2	24.00			50		24.00	13.70		8

¹ In addition 15.92 miles supported by elevated railroad structures and by buildings and bridges.² Includes 85.72 miles of cable and 35.05 miles of steam.³ Includes 4.45 miles operated by steam.⁴ Not reported.⁵ Includes 1.25 miles operated by steam.⁶ Includes 11.72 miles operated by steam.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

Number.	STATE AND NAME OF COMPANY.	TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.													
		Total owned and leased.	Main track.		Sidings and turn-outs.	Overhead trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.
CONNECTICUT.															
	Total for state	578.49	461.05	89.50	27.94	552.60		25.89		543.06	35.43	14.94	16.75	72.56	
1	Branford Lighting and Water	6.51	5.15		1.36	6.51				6.51				2.16	
2	Connecticut Railway and Lighting	159.28	118.32	33.40	7.56	159.28				159.28				25.06	
3	Bristol and Plainville Tramway	7.92	7.34		.58	7.92				7.92				.50	
4	Danbury and Bethel	11.73	10.44	.20	1.09	11.73				11.73				.20	
5	Greenwich Tramway	5.76	5.57		.19	5.76				5.76			5.76	.38	
6	Hartford and Springfield	13.47	13.00		.47	13.47				13.47			6.00		
7	Farmington Street Railway	10.80	9.70		1.10	10.80				10.80		3.80		1.30	
8	Hartford Street Railway	87.67	66.26	18.58	2.83	87.67				77.47	10.20	6.25	.08	2.30	
9	Hartford, Manchester and Rockville	18.13	17.69		.44	18.13				17.34	.79			.57	
10	New York, New Haven and Hartford (Berlin system)	25.89	21.02	3.18	1.69		3d rail	25.89		25.89				21.02	
11	Meriden, Southington and Compounce	12.34	11.64		.70	12.34				12.34		2.05		2.82	
12	Meriden Electric Railroad	19.50	17.40	1.50	.60	19.50				19.50					
13	Middletown Street Railway	9.93	9.05		.88	9.93				9.93					
14	Manufacturers Railroad	1.36	1.36			1.36				1.36					
15	Fair Haven and Westville	95.67	59.60	31.32	4.75	95.67				71.23	24.44			3.00	
16	New London Street Railway	8.51	6.70	1.32	.49	8.51				8.51					
17	Montville Street Railway	10.67	10.46		.21	10.67				10.67		2.84			
18	Norwich Street Railway	17.65	17.00		.65	17.65				17.65				.75	
19	Peoples Tramway	16.44	15.94		.50	16.44				16.44				4.50	
20	Stamford Street Railroad	12.69	12.49		.20	12.69				12.69					
21	New York, New Haven and Hartford (New Canaan branch)	8.63	7.66		.97	8.63				8.63					
22	Suffield Street Railway	4.91	4.70		.21	4.91				4.91			4.91		
23	Torrington and Winchester	13.03	12.56		.47	13.03				13.03				8.00	
DELAWARE.															
	Total for state	85.61	71.55	11.45	2.61	85.61				85.61		4.05	21.25	24.17	3.13
1	Wilmington and New Castle	13.45	13.00		.45	13.45				13.45		4.05	9.25	9.00	
2	Peoples Railway	31.38	26.50	4.50	.88	31.38				31.38			10.00	4.00	.50
3	Wilmington City	40.78	32.05	6.95	1.78	40.78				40.78			2.00	11.17	2.63
DISTRICT OF COLUMBIA.															
	Total for district	161.97	82.68	79.29		76.89		85.08		161.97		6.70	5.68	36.81	
1	Anacostia and Potomac River	18.10	9.83	8.27		2.96	Conduit	15.14		18.10		4.80			
2	Brightwood Railway	11.69	5.85	5.84		11.69				11.69					
3	Capital Traction	40.69	20.35	20.34		11.00	Conduit	29.69		40.69		.67	4.73		
4	City and Suburban of Washington	31.80	16.08	15.72		19.76	Conduit	12.04		31.80		.82		14.09	
5	Columbia Railway	14.72	7.84	6.88		9.18	Conduit	5.54		14.72			.95	8.74	
6	Georgetown and Tennallytown	8.32	4.40	3.92		8.32				8.32					
7	Metropolitan Railroad	22.67	11.34	11.33			Conduit	22.67		22.67		.41			
8	Washington and Great Falls	13.98	6.99	6.99		13.98				13.98				13.98	
FLORIDA.															
	Total for state	61.75	57.43	1.64	2.68	57.00			4.75	61.75			1.25	.04	.33
1	Fort Meade Street Railway	1.25	1.25						1.25	1.25					
2	Jacksonville Electric	18.15	15.89	1.14	1.12	18.15				18.15				.04	
3	Key West Electric	3.74	3.54		.20	3.74				3.74					
4	Palatka and Heights Street Railway	3.50	3.50						3.50	3.50					.33
5	Pensacola Electric Terminal	9.00	8.50		.50	9.00				9.00					
6	Tampa Electric	26.11	24.75	.50	.86	26.11				26.11			1.25		
GEORGIA.															
	Total for state	300.38	222.18	72.22	5.98	296.63			3.75	300.38		3.00	6.20	30.94	3.05
1	Athens Electric Railway	6.53	6.50		.03	6.53				6.53				.75	.05
2	Georgia Railway and Electric	150.00	104.00	43.00	3.00	150.00				150.00		3.00	3.00	11.00	
3	Augusta Railway and Electric	31.02	16.97	12.36	1.69	31.02				31.02			2.45		
4	Columbus Railroad	17.00	14.90	2.00	.10	17.00				17.00					
5	Covington and Oxford	2.25	2.12		.13				2.25	2.25				.50	
6	Macon Railway and Light	30.67	28.00	2.00	.67	30.67				30.67					
7	City Electric Railway	6.28	6.20		.08	6.28				6.28					
8	Savannah Electric	53.05	39.99	12.86	.20	53.05				53.05				18.36	3.00
9	Valdosta Street Railway	2.08	2.00		.08	2.08				2.08				1.00	
10	Washington Street Railway	1.50	1.50						1.50	1.50				.08	
IDAHO.															
	Total for state	3.50	3.33		.17	3.50				3.50					
1	Boise Rapid Transit	3.50	3.33		.17	3.50				3.50					

1 For details see Supplementary Table 1.

2 For feeder conduit system see Supplementary Table 2.

3 Includes track within city limits for 3 companies. (See note 4.)

GENERAL TABLES.

279

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi. Mini. mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground. (2)	
239.66	*338.83				57	5,900	25	4	236.34	202.73	.96		89.30	350.73	479.05		
2.99	3.52		60 60	T	1	175				5.15		50		5.15	8.96		1
69.16	90.12		90 35	T, girder	13	2,500	14		98.00	20.00	.32	49	3.00	115.32	151.72		2
1.75	6.17		60 56	T	5	240			3.00	4.34		44		7.34	6.50		3
5.50	6.23		80 48	T, full groove			3		10.44			43		10.44	8.00		4
5.76			80 80	T	1	146				5.57		52		5.57	5.57		5
2.50	10.97		70 60	T	2	340				13.00		60		13.00	13.00		6
	10.80		56 56	T	2	165				9.70		45		9.70	9.70		7
43.80	43.87		107 70	T, girder, groove.	10	507	1		31.23	34.39	.64	45	31.92	34.34	49.70		8
2.00	16.13		56 56	T	7	425		1	.38	17.31		52	.79	16.90	30.00		9
	*25.89																10
	*12.34		56 56	T	4	240			3.00	8.64		63		11.64	11.64		11
19.50			90 40	T, girder			2	1	9.50	7.90		50		17.40	17.00		12
3.00	6.98		52 38	T					5.05	4.00		53		9.05	7.00		13
1.36			70 70	T						1.36		50		1.36			14
36.00	59.67		80 50	T	2	100	2	1	45.60	14.00		50	52.79	6.81	100.00		15
8.51			48 48	T					6.14	.56		50	.30	6.40	15.24		16
	10.67		60 60	T	4	530		1	1.50	8.96		50		10.46	10.46		17
7.23	10.42		90 48	T			1		5.00	12.00		50	.50	16.50	14.00		18
9.00	7.44		72 56	T	3	182			2.50	13.44		50		15.94	10.00		19
12.69			70 60	T					12.00	.49		50		12.49			20
	*8.63									7.66		50		7.66			21
4.91			66 66	T						4.70		52		4.70			22
4.00	9.03		56 56	T	3	350	2		3.00	9.56		48		12.56	10.56		23
53.98	31.63				19	2,366	7	12	47.89	23.66				71.55	121.50		
6.00	7.45		70 58	Girder, T	6	470	2	5	4.00	9.00		52		13.00	11.50		1
21.00	10.38		90 60	Girder, T, groove, full groove.	10	985	1		26.25	.25		52		26.50	60.00		2
26.98	13.80		95 56	Girder, T, groove.	3	911	4	7	17.64	14.41		53		32.05	50.00		3
126.49	35.48	39.63			25	3,912	5	1	15.26		23.92		7.44	31.74	93.58	66.25	
18.10		12.63	83 62	T, girder			2		1.48			52	.37	1.11		2.27	1
11.69			83 70	T, girder					.11		5.74	52	.11	5.74	2.81		2
37.04	3.65	27.00	95 50	T, full groove	2	1,117	2				5.50	42	.50	5.00	5.25	9.21	3
22.27	9.53		95 62	T, full groove, girder.	4	239					9.88	52	3.89	5.99	31.06	21.05	4
14.72			86 67	T, full groove, girder.	5	677	1		5.08			52	.88	4.20	7.31		5
	8.32		83 60	T, girder	1	12			1.60		2.80	58	1.60	2.80	31.29		6
22.67			83 67	Groove				1								33.72	7
	13.98		60 58	T, girder	13	1,867			6.99			52	.09	6.90	15.86		8
49.19	12.56				2	270	1	17	43.68	9.00				52.68	30.00		
1.25			30 30	T													1
16.70	1.45		70 40	T, girder	1	220		7	15.89			52		15.89	8.80		2
3.74			65 60	T					3.54			52		3.54	2.20		3
3.50			40 25	Groove, T				2									4
9.00			60 50	T				6	7.50	1.00		52		8.50	3.00		5
15.00	11.11		60 30	T	1	50	1	2	16.75	8.00		52		24.75	16.00		6
200.40	99.98				18	460	5	21	163.98	45.40	9.18		12.00	206.56	177.20	9.00	
6.48	.05		74 40	T, girder					6.42	.08		40		6.50	7.00		1
90.70	59.30		88 40	Girder, half groove, T.				2	94.00	10.00		40	12.00	92.00	117.00	9.00	2
31.02			70 30	T				8	9.97	3.16	3.84	44		16.97	14.00		3
10.40	6.60		56 40	T	9	250		8		13.76	1.14	45		14.90	12.00		4
2.03	.22		25 25	T	3	30		1									5
20.50	10.17		70 30	T	2	60			19.60	4.20	4.20	50		28.00	12.00		6
5.08	1.20		40 30	T			1	1	2.00	4.20		48		6.20	1.60		7
31.69	21.36		70 35	T	4	120	4		29.99	10.00		50		39.99	12.20		8
1.00	1.08		45 45	T					2.00			50		2.00	1.50		9
1.50			45 45	T				1									10
2.50	1.00								3.33					3.33	3.50		
2.50	1.00		70 40	T					3.33			50		3.33	3.50		1

* Includes track within city limits.

* Includes 12.14 miles of double trolley construction.

* Double trolley construction.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for op-eration during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by com-pany.	Not owned by com-pany.
ILLINOIS.															
	Total for state.....	\$1,687.62	992.85	583.37	61.40	1,420.23		\$201.96	15.43	1,277.99	359.63	54.04	82.74	191.29	23.08
1	Alton Railway, Gas and Electric	12.25	12.00		.25	12.25				12.25				1.00	
2	Elgin, Aurora and Southern	62.96	59.84	2.12	1.00	62.96				62.96				11.00	
3	Bloomington and Normal	21.00	20.00		1.00	21.00				21.00			6.00	3.00	
4	Mechanicsburg and Buffalo	3.70	3.62		.08				3.70						3.20
5	Cairo Electric Railway	5.67	5.52		.15	5.67				5.67					
6	Egypt Electric	4.00	3.90		.10	4.00				4.00					
7	Centralia and Central City	3.42	3.00		.42				3.42	3.42					.08
8	Urbana and Champaign	9.00	8.00	.50		9.00				9.00			1.50	1.50	
9	Chicago City Railway	222.50	104.90	104.90	12.70	179.60	Cable	41.10	1.80	222.50			4.50		
10	Chicago Union Traction	305.15	155.42	148.41	1.32	\$250.26	Cable	\$50.60	4.29		305.15	.17			
11	Chicago Consolidated Traction	181.16	98.27	86.54	1.35	180.49			.67	166.24	14.92	25.35		.30	
12	Calumet Electric Street Railway	80.94	42.12	38.50	.32	80.94				79.32	1.62		.25	4.20	
13	Chicago Electric Traction	\$28.50	19.00	7.00	2.50	28.50				28.50					
14	Chicago General Railway	21.14	10.86	8.73	1.55	21.14				21.14		4.60			
15	Chicago General Electric Railway	1.50	1.50				Str. bat.	1.50		1.50					
16	Suburban Railroad	43.59	22.94	19.65	1.00	43.59				30.80	102.79			11.00	
17	Northwestern Elevated Railroad	30.37	8.42	19.46	2.49		3d rail	30.37		29.57	.80			24.57	
18	South Side Elevated Railroad	21.08	8.72	10.22	2.14		3d rail	21.08		21.08		1.98		6.25	2.47
19	Metropolitan West Side Elevated	39.34	16.86	120.48	2.00		3d rail	39.34		38.96	.38	2.00	1.91	39.34	
20	South Chicago City Railway	38.42	19.11	19.11	.20	38.42				38.42					
21	Chicago and Milwaukee	43.00	26.00	16.00	1.00	43.00				43.00		1.50		20.00	10.00
22	Lake Street Elevated Railroad	\$20.97	10.11	9.32	1.54	3.00	3d rail	17.97		20.97		6.32	.75		
23	Chicago and Joliet	62.89	46.19	14.40	2.30	62.89				38.92	23.97		24.00	11.00	
24	Northern Electric Railway	4.00	3.50		.50	4.00				4.00					
25	Danville Railway and Light	12.50	8.50	3.50	.50	12.50				12.50			1.00		1.50
26	Danville, Paxton and Northern	13.50	13.00		.50	13.50				13.50		.50	5.50	9.00	
27	Decatur Traction and Electric	13.50	13.00		.50	13.50				13.50				.38	1.62
28	East St. Louis Railway	19.95	9.70	9.07	1.18	19.95				19.95					
29	St. Louis and Belleville	21.49	9.65	9.65	2.19	21.49				21.49					
30	East St. Louis and Suburban	53.60	42.16	10.02	1.42	53.60				53.60		4.62	11.03	8.83	
31	St. Louis and East St. Louis	2.12	1.06	1.06		2.12				2.12					2.12
32	Granite City and St. Louis	13.25	10.25	3.00		13.25				13.25			2.00	1.00	1.94
33	Freeport Electric	7.50	6.50	.75	.25	7.50				7.50			2.00		
34	Galesburg Electric Motor	17.00	16.00	.40	.60	17.00				17.00				2.00	
35	Chicago, Harvard and Geneva Lake	11.12	11.00	.12	.12	11.12				11.12				.50	
36	Jacksonville Railway	5.19	5.00		.19	5.19				5.19					
37	Kankakee Electric Railway	8.45	7.50		.95	8.45				8.45				.24	
38	North Kankakee Light and Railway	4.33	4.20		.13	4.33				4.33					.15
39	Lincoln Street Car	7.05	7.00		.05	7.05				7.05					
40	Coal Belt Electric Railway	17.30	17.00		.30	17.30				17.30			17.30	12.00	
41	Murphysboro Street Railway	1.55	1.50		.05				1.55	1.55					
42	Ottawa Railway, Light and Power	8.50	8.20		.30	8.50				8.50			1.00		
43	Peoria and Prospect Heights	6.25	6.00		.25	6.25				6.25		.25			
44	Central Railway	35.00	14.00	14.00	7.00	35.00				35.00			1.50	3.50	
45	Peoria and Pekin Terminal	8.68	7.73		.95	8.68				8.68		5.50		8.68	
46	Quincy Horse Railway	17.38	13.12	3.58	.68	17.38				17.38			1.00		
47	Rockford Railway, Light and Power	23.00	20.00	3.00		23.00				23.00					
48	Rockford and Belvidere	13.53	13.21		.32	13.53				13.53		1.25		12.00	
49	Springfield Consolidated	23.83	17.52		6.31	23.83				23.83			1.50		
50	Peoples Light and Railway	5.50	5.25		.25	5.50				5.50					
INDIANA.															
	Total for state.....	646.66	523.60	99.57	23.49	643.87			2.79	646.66		22.84	67.88	150.63	27.29
1	Brownstown and Ewing	1.00	1.00						1.00	1.00					
2	John S. Crump	4.40	4.25		.15	4.40				4.40					
3	Evansville Electric Railway	30.50	18.52	10.18	1.50	30.50				30.50			5.83		.99
4	Fort Wayne Traction	32.00	19.35	11.00	1.65	32.00				32.00				1.00	5.00
5	Fort Wayne and Southwestern	26.62	26.00		.62	26.62				26.62				21.23	
6	Hammond, Whiting and East Chicago	24.90	17.17	6.46	1.27	24.90				24.90					
7	Indianapolis Street Railway	109.86	57.39	52.39	.08	109.86				109.86				9.11	
8	Broad Ripple Traction	7.20	5.00	1.50	.70	7.20				7.20				2.50	
9	Indianapolis, Shelbyville and Southeastern	27.55	27.00		.55	27.55				27.55		2.50	27.55	12.00	
10	Indianapolis and Eastern	18.04	16.41		1.60	18.04				18.04		10.20			
11	Union Traction	142.92	130.40	5.17	7.35	142.92				142.92		7.14		61.14	
12	Indianapolis, Greenwood and Franklin	19.00	18.00		1.00	19.00				19.00		3.00		16.00	
13	Jeffersonville City Railway	1.79	1.75		.04				1.79	1.79					
14	Kokomo Railway and Light	10.75	10.50		.25	10.75				10.75			5.00	1.25	
15	Lafayette Street Railway	14.66	14.06		.60	14.66				14.66					
16	Logansport Railway	6.16	5.50		.66	6.16				6.16					.50
17	Logansport, Rochester and Northern	6.00	5.30		.70	6.00				6.00			6.00	1.30	

1 For details see Supplementary Table 1.

2 For feeder conduit system see Supplementary Table 2.

3 Includes 2.12 miles duplicated track. (See notes 9 and 13.)

4 Includes 91.70 miles cable, 108.76 miles third rail, and 1.50 miles storage battery.

5 2.83 miles of this track was also operated by animal power.

6 6.80 miles of this track was also operated by compressed air.

7 6 miles of construction suspended on elevated railroad structure.

GENERAL TABLES.

281

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAIL-ROAD CROSS-INGS. NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equip- ped with cast-welded joints.	Weight of rails per yard. Maxi. Mini- mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground. ⁽²⁾	
1,392.50	245.12	292.68			101	17,320	591	218	799.06	84.28	15.91		264.35	626.40	1,436.70	82.60	
12.25			70	40	T, girder			1	12.00			42	25	11.75	8.00		1
32.00	30.96		80	40	Girder, T	3	1,560	7	46.34	13.50		45	2.00	57.84	130.00		2
17.00	4.00		70	45	T	3	60	6	19.00	46	54	52	75	19.25	17.26		3
5.50	3.20		52	32	T												4
5.67			56	40	T			4	1.25	4.27		42		5.52			5
4.00			45	45	T			2	3.90			42		3.90			6
2.00	1.42		25	25	T			3	8.00			53		8.00	8.00		7
7.50	1.50		76	40	T			3	86.70			50	66.70	20.00	432.00	12.60	8
222.50		153.09	100	63	Girder, T, full groove			385	10								9
305.15		88.49	110	30	Girder, T, groove, full groove	3	5,393	30	125.00		7.00	45	126.00		128.00	70.00	10
181.16		22.00	85	30	Girder, T, groove, full groove	4	1,800	20	91.92	1.35		45	45.77	45.00	92.00		11
80.12	82	24.50	100	70	Girder	1	528	1	36.65	1.40	4.04	42	3.25	38.87	40.44		12
18.00	10.50		85	60	Girder, T	3	40	22	19.00			45	5.00	14.00	28.00		13
21.14		4.60	80	56	Girder, T			4	10.86			48		10.86	9.50		14
1.50			60	60	Full groove			1									15
43.59			80	80	T	2	120	8	22.19		75	45	1.75	21.19	26.00		16
30.37			80	80	T										1130.00		17
21.08			90	90	T										1145.00		18
39.34			80	80	T	1	174								1180.00		19
38.42			80	56	Girder			54	19.11			42	1.00	18.11	44.50		20
22.50	20.50		85	65	T, Girder	10	920	50	18.50	7.50		46	1.75	24.25	26.00		21
20.97			80	70	T	1	125		1.50			45		1.50	110.00		22
23.76	39.13		106	60	Flat, girder, T	27	800	11	31.51	13.05	1.63	53		46.19	62.90		23
4.00			45	45	Girder			6		3.00	50	48	50	3.00			24
11.00	1.50		60	45	T	2	210	1	8.50			50		8.50	9.00		25
4.00	9.50		60	56	T			3	4.00	9.00		59		13.00	5.50		26
11.00	2.50		62	40	T, girder			7	13.00			50		13.00	5.00		27
19.95			92	65	T, girder			4	9.70			50		9.70	14.10		28
11.07	21.49		65	65	T, girder	1	1,200	1	9.65			48		9.65	6.44		29
11.07	42.53		92	65	T, girder	14	1,657	14	42.16			48		42.16	44.47		30
2.12			45	45	Groove			2	1.06			50	1.06				31
10.28	2.97		80	48	T			8	6.29	2.51	1.45	67		10.25	5.10		32
5.00	2.50		56	56	T			3	6.50			50		6.50	3.00		33
12.50	4.50		60	45	T	1	150	4	10.25	5.75		50	10	15.90	6.00		34
1.00	10.12		60	60	T			1	1.00	10.00		52		11.00	9.00		35
4.19	1.00		60	25	T				5.00			43	4.00	1.00	1.38		36
8.45			56	40	Girder, T			4	6.74	76		36	47	7.03	3.00		37
4.20	13		57	40	Girder, T			3	2.20	2.00		42		4.20	4.00		38
7.05			45	45	T			3	7.00			40		7.00	7.00		39
5.00	12.30		60	56	T	6	140	3	17.00			45		17.00	6.50		40
1.55			48	48	T			2									41
7.50	1.00		65	40	T, girder	3	75	2	7.20	1.00		50		8.20	8.50		42
4.50	1.75		70	65	T, girder	1	350	1	6.25			50		6.25	5.00		43
35.00			80	80	Girder	3	76	1	14.00			50		14.00	15.00		44
1.38	7.30		70	60	Girder, T	4	1,319	4		7.73		40		7.73	7.73		45
17.38			60	45	Girder, T			1	12.12	1.00		52		13.12	17.38		46
23.00			70	40	T			1	20.00			52	3.00	17.00	15.00		47
1.53	12.00		60	60	T	8	613	1	13.21			45		13.21	14.00		48
23.83			93	35	Girder, T			12	17.52			50	1.00	16.52	7.00		49
5.50			52	52	Girder			27	5.25			50		5.25			50
368.32	278.34	32.00			142	9,699	103	131	357.80	135.05	28.00		68.56	452.29	551.38		
1.00			25	20	T												1
4.40			86	30	T, girder			6	4.25			50		4.25			2
28.00	2.50		70	30	T			8	11.82	5.00	2.00	50	10.82	8.00	45.00		3
20.00	12.00		70	60	T	4	200	7	13.35	1.00	5.00	53	2.35	17.00	9.85		4
4.77	21.85		56	56	T	14	590	5	4.77	21.23		50	4.77	21.23	5.00		5
15.00	9.90		80	56	T, girder			18	17.17			42		17.17	22.00		6
100.75	9.11	30.00	90	38	T, girder			32	36.39		21.00	45	42.39	15.00	68.50		7
1.00	7.20		65	56	T			1	5.00			40		5.00			8
	26.55		60	60	T	28	1,250	2	4.00	23.00		50	1.00	26.00	15.00		9
1.00	17.04		70	70	T	6	110	2	1.00	15.44		52	1.00	15.44	16.00		10
69.69	73.23		90	35	T, girder, full groove	44	2,901	67	127.40	3.00		53	1.50	128.90	250.00		11
2.00	17.00		60	60	T	3	135	2	2.00	16.00		50	1.20	16.80	17.50		12
1.73			35	35	T			1									13
9.50	1.25		70	30	T	2	24	1	9.50	1.00		40	25	10.25	50		14
11.06	3.60		72	56	Groove, T	2	1,000	3	9.06	5.00		53	1.00	13.06	10.00		15
5.00	1.16		40	40	T				5.50			52		5.50	1.50		16
4.50	1.50		70	56	T			5	4.30	1.00		52	25	5.05			17

² 2.50 miles of construction suspended on elevated railroad structure.³ Includes 1.62 miles leased to an operating company.⁴ Leased from steam railroad.⁵ Feeders on elevated railroad structure.⁶ Second and third main track.⁷ Includes .80 mile leased to an operating company.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.
INDIANA—Continued.															
18	Madison Light and Railway	4.00	3.60		.40	4.00				4.00					
19	Lake Cities	2.06	2.00		.06	2.06				2.06					
20	Highland Railroad	2.00	1.50		.50	2.00				2.00				2.00	
21	New Albany Street Railroad	6.11	5.61		.50	6.11				6.11			2.00		
22	Richmond Street and Interurban	30.50	30.00		.50	30.50				30.50			20.00		20.00
23	Indiana Railway	48.75	44.44	3.65	.66	48.75				48.75				16.75	
24	Terre Haute Electric	38.09	31.37	5.72	1.00	38.09				38.09			1.50		
25	Vincennes Citizens	8.00	5.00	3.00		8.00				8.00					
26	Wabash River Traction	19.85	18.35	.50	1.00	19.85				19.85				6.35	
27	Washington Street Railway	3.95	3.80		.15	3.95				3.95					.80
IOWA.															
Total for state		378.25	315.73	44.80	17.72	*374.43			3.82	378.25		8.65	47.32	77.40	2.07
1	Boone Electric	6.50	6.50			6.50				6.50				4.00	.50
2	Burlington Railway and Light	14.50	12.00	2.00	.50	14.50				14.50					
3	Cedar Rapids and Marion City	13.79	12.16	1.46	.17	13.79				13.79					
4	Peoples Street Railway	1.62	1.50		.12				1.62						
5	State Electric	8.52	7.54	.42	.56	8.52				8.52					
6	Omaha and Council Bluffs	32.40	19.05	11.35	2.00	32.40				32.40	1.00			.25	
7	Tri-City Railway	50.40	34.90	14.65	.85	49.40			1.00	50.40			1.25	2.04	.82
8	Des Moines City Railway	63.37	52.18	7.62	3.57	63.37				63.37			6.56	8.31	
9	Interurban Railway	24.16	23.50		.66	24.16				24.16		7.65	21.50	23.00	
10	Union Electric	20.85	17.20	3.30	.35	20.85				20.85				1.70	
11	Fort Dodge Light and Power	1.50	1.50			1.50				1.50					
12	Fort Madison Street Railway	4.00	3.88		.12	4.00				4.00					
13	Independence and Rush Park	3.40	3.33		.07	3.40				3.40					.75
14	Keokuk Railway and Power	6.50	6.50			6.50				6.50					
15	Marshalltown Light, Power and Railway.	3.60	3.50		.10	3.60				3.60					
16	Mason City and Clear Lake	17.34	16.31		1.03	17.34				17.34				7.10	
17	Citizens Railway and Light	8.60	8.50		.10	8.60				8.60				1.00	
18	Ottumwa Traction and Light	10.00	9.58		.42	10.00				10.00			3.01		
19	Red Oak Street Railway	1.20	1.20						1.20						
20	Sioux City Traction	43.00	37.00	4.00	2.00	43.00				43.00				8.00	
21	Tama and Toledo	3.00	2.90		.10	3.00				3.00					
22	Waterloo and Cedar Falls	40.00	35.00		5.00	*40.00				40.00			15.00	22.00	
KANSAS.															
Total for state		150.26	119.88	24.48	5.90	128.63			21.63	150.26			.59	12.33	.83
1	Arkansas City Street Railway	5.50	5.00		.50				5.50	5.50				.50	
2	Atchison Railway, Light and Power.	9.00	8.00	.25	.75	9.00				9.00					.45
3	Fort Scott Consolidated Supply	9.00	8.93		.07	9.00				9.00				.50	.25
4	Hutchinson Street Railway	7.83	7.50		.33				7.83						
5	Iola Electric Railroad	8.25	8.00		.25	8.25				8.25				6.50	
6	Electric Railway and Ice	4.50	4.33		.17	4.50				4.50				1.75	
7	Kansas City—Leavenworth	39.00	25.00	13.00	1.00	39.00				39.00					
8	Pittsburg Railroad	11.75	10.25	1.38	.12	11.75				11.75			.34	2.75	
9	Consolidated Street Railway	2.05	2.02		.03				2.05						
10	Topeka Railway	28.63	20.85	5.85	1.93	28.63				28.63			.25		.13
11	Wichita Railroad and Light	18.50	14.00	4.00	.50	18.50				18.50				.33	
12	Union Street Railway	6.25	6.00		.25				6.25	6.25					
KENTUCKY.															
Total for state		283.95	188.56	91.89	3.50	283.95				283.95		12.41	23.00	30.17	.25
1	Bowling Green Railway	4.00	3.86		.14	4.00				4.00			1.50		
2	Cincinnati, Newport and Covington	50.00	25.00	25.00		50.00				50.00		6.00		7.00	
3	Frankfort and Suburban	7.26	7.25		.01	7.26				7.26				5.00	
4	Henderson Street Railway	5.50	5.25		.25	5.50				5.50					
5	Lexington Railway	15.13	12.00	3.00	.13	15.13				15.13				.50	
6	Georgetown and Lexington	12.08	12.00		.08	12.08				12.08		1.00	12.00		
7	Louisville Railway	142.00	79.00	62.00	1.00	142.00				142.00			3.00	.17	
8	Louisville, Anchorage and Pewee	14.10	14.00		.10	14.10				14.10		4.50	6.00	13.00	
9	Kentucky and Indiana	5.13	3.20	1.89	.04	5.13				5.13		.91			
10	Maysville Street Railroad	4.25	4.00		.25	4.25				4.25				1.00	
11	Owensboro City Railroad	8.50	8.00		.50	8.50				8.50			.50	2.00	
12	Paducah City Railway	16.00	15.00		1.00	16.00				16.00				1.50	.25
LOUISIANA.															
Total for state		198.52	134.67	58.91	4.94	192.86			5.66	198.52		.32	4.07	4.56	
1	Baton Rouge Electric and Gas	3.75	3.67		.08	3.75				3.75					
2	Lake Charles Street Railway	2.11	2.00		.11				2.11	2.11					
3	St. Charles Street Railroad	18.57	14.97	2.95	.65	18.57				18.57			4.07	.50	
4	Orleans Railroad	11.21	9.44	1.52	.25	11.21				11.21		.32		.25	
5	New Orleans Railways	115.00	76.31	36.23	2.46	115.00				115.00				2.46	
6	New Orleans and Carrollton	35.53	17.78	16.71	1.04	35.53				35.53				1.04	
7	Algiers, McDonoghville and Gretna.	3.55	3.50		.05				3.55	3.55				.03	
8	Shreveport Belt Railway	8.80	7.00	1.50	.30	8.80				8.80				.28	

¹ For details see Supplementary Table 1.

² 22 miles of this track was also operated by steam.

³ Includes track for 1 company outside city limits. (See note 5.)

GENERAL TABLES.

283

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAIL-ROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.	
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard.		Style of rail.	No.	Length, feet.	Protected.	Unprotected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Overhead.		Underground.
			Maxi.	Mini.														
4.00			56	45	T					3.20	.40		53		3.60			18
2.06		2.00	72	45	T, girder			3		2.00			52		2.00	.25		19
	2.00		40	40	T	2	150			1.47	.03		60	.03	1.47	3.00		20
6.11			62	56	T			2		5.61			43		5.61	1.50		21
10.00	20.50		70	60	T, girder	7	835	2	2	12.00	18.00		50		30.00	25.00		22
31.75	17.00		70	70	T	11	905	11		41.94	2.50		44	2.00	42.44	25.00		23
18.09	20.00		72	40	T	8	1,391	7	2	20.37	11.00		35		31.37	20.40		24
8.00			60	40	T			2	1	5.00			52		5.00	4.00		25
5.70	14.15		74	60	T	11	208	1	5	6.90	11.45		52		18.35	16.35		26
3.15	.80		35	30	T				1	3.80			40		3.80	.03		27
228.08	80.17	11.00				45	9,307	61	55	263.05	47.66	1.32		5.92	306.11	264.55		
2.00	4.50		45	40	T	3	200		7	2.00	4.50		52		6.50			1
14.50			66	45	T			2	2	12.00			44		12.00	7.00		2
11.21	2.58		58	35	Girder, T	2	270	6	6	6.19	4.65	1.32	45	1.32	10.84	15.00		3
1.62			20	20	T				1									4
8.00	.52		50	45	Girder, T					7.54			42		7.54	4.00		5
29.40	3.00		45	40	Girder, T	2	3,326	1	10	18.12	.93		52	.90	18.15	31.00		6
42.57	7.83	3.50	80	52	Girder	2	536	2	4	33.90			52		33.90	47.00		7
63.37		2.50	90	32	Girder, T	1	600	20		52.18			52		52.18	26.01		8
	24.16		70	70	T	14	1,400	1			23.50		52		23.50	14.00		9
16.50	4.35		52	30	Girder, T	12	107	2	2	17.20			50	1.00	16.20	10.00		10
1.50			60	60	T					1.50			60	.50	1.00			11
4.00			65	40	T			1		3.88			52		3.88	3.50		12
3.40			45	45	T				1	1.25	2.08		66		3.33			13
6.50			70	35	T				2	6.00	.50		45		6.50	5.00		14
3.60			40	35	T			4		3.50			53		3.50	2.00		15
9.61	7.73		60	60	T	3	240	2	1	15.39	.92		53	.20	16.11	12.00		16
8.60			56	48	T				3	8.50			44		8.50			17
9.50	.50		60	36	T			2	2	9.00	.58		55		9.58	1.04		18
1.20			20	20	Flat													19
40.00	3.00	2.00	60	35	Girder, T	4	950	20	1	27.00	10.00		44	2.00	35.00	25.00		20
3.00		3.00	40	40	T				1	2.90			45		2.90			21
18.00	22.00		72	48	T	2	1,318		12	35.00			52		35.00	62.00		22
130.66	19.60					19	3,187	18	25	60.93	9.41	4.02		4.00	70.36	40.36		
5.00	.50		40	24	T, flat				2									1
8.55	.45		45	30	T			1		6.75	.75	.50	45	.50	7.50	2.00		2
8.25	.75		45	35	T			1		8.93			42		8.93	9.00		3
7.83			20	20	T			3										4
1.75	6.50		56	56	T	8	375		3	1.57	6.41	.02	56		8.00	6.50		5
2.75	1.75		80	56	Girder, T	1	320		1	4.33			48		4.33	4.50		6
39.00			100	60	Girder, T													7
6.50	5.25		40	40	T	1	300	1	7	10.25			45		10.25	5.00		8
1.28	.77		18	18	T			1										9
25.33	3.30		67	35	Girder, groove, T	4	1,160	1	4	17.35		3.50	49	3.50	17.35	11.36		10
18.17	.33		70	35	T	5	1,032	8	4	11.75	2.25		43		14.00	2.00		11
6.25			40	25	T, flat			2	4									12
221.23	62.72					11	1,140	38	38	158.57	29.99			25.00	163.56	146.73		
2.00	2.00		60	30	T			1	2	3.50	.36		52		3.86	.25		1
43.00	7.00		90	60	T, girder	4	325	1	2	25.00			50	25.00		25.00		2
5.25	2.01		56	45	T				1	7.25			42		7.25			3
5.00	.50		50	40	T				2	5.25			52		5.25	1.00		4
14.50	.63		60	50	T	1	30	11		12.00			60		12.00	10.00		5
1.00	11.08		60	40	T	1	105	2		12.00			50		12.00	1.50		6
124.00	18.00		107	35	Girder, T, groove			18	6	70.00	9.00		53		79.00	79.00		7
1.00	13.10		70	60	T	2	210				14.00		52		14.00	14.00		8
2.73	2.40		75	75	T			4		2.32	.88		44		3.20	3.23		9
3.00	1.25		40	35	T	2	450			1.00	3.00		60		4.00	2.00		10
6.25	2.25		56	40	T			1	6	7.00	1.00		42		8.00	.75		11
13.50	2.50		74	35	T	1	20		19	13.25	1.75		52		15.00	10.00		12
196.22	2.30					1	150	28	38	112.10	9.01	8.06		38.55	90.62	265.61		
3.75			48	48	T					3.67			45		3.67	1.50		1
2.11			35	25	Groove													2
18.57			120	58	Girder			7	3	12.30	2.57		46	12.02	2.95	25.00		3
11.21			120	90	Girder					7.18	2.26		46	4.44	5.00	9.61		4
115.00			120	40	T, girder			16	28	73.87	2.16	.28	46	9.53	66.78	199.00		5
35.53			120	70	T, girder			5		8.58	1.42	7.78	46	12.56	5.22	30.00		6
1.25	2.30		30	30	T				2									7
8.80			70	40	Girder, T	1	150		5	6.50	.50		50		7.00	.50		8

¹ This company failed to make a report: the information given was obtained from street-railway journals and directories.² Includes track outside city limits.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for op-eration during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by com-pany.	Not owned by com-pany.
MAINE.															
	Total for state	331.55	304.71	13.89	12.95	328.55			3.00	328.08	3.47	1.90	33.60	29.61	.67
1	Augusta, Winthrop and Gardiner	13.11	12.49		.62	13.11				13.11			5.00	4.00	.50
2	Public Works	10.80	8.70	1.50	.60	10.80				10.80					
3	Penobscot Central Railway	27.31	26.25		1.06	27.31				27.31		.28	6.00		
4	Bangor, Orono and Old Town	16.70	16.20		.50	16.70				16.70					
5	Bangor, Hampden and Winterport	5.40	4.52		.88	5.40				5.40		1.62			
6	Biddeford and Saco	8.15	7.61		.64	8.15				8.15					
7	Calais Street Railway	7.10	7.00		.10	7.10				7.10				.11	
8	Benton and Fairfield	4.37	4.12		.25	4.37				4.37			.12	2.00	.12
9	Fryeburg Horse Railway	3.00	3.00			3.00			3.00	3.00					
10	Atlantic Shore Line	1.58	1.57		.01	1.58				1.58					
11	Lewiston, Brunswick and Bath	56.18	54.75		1.43	56.18				56.18			8.02	7.00	
12	Norway and Paris	2.14	2.13		.01	2.14				2.14					
13	Portland Railroad	89.63	73.70	12.39	3.54	89.63				89.63			15.00	.50	
14	Portsmouth, Kittery and York	15.70	15.50		.20	15.70				15.70				4.00	
15	Rockland, Thomaston and Camden	21.64	21.07		.57	21.64				21.64			4.43	3.75	.04
16	Sanford and Cape Porpoise	25.39	23.40		1.99	25.39				21.92	3.47		.03	7.50	.01
17	Skowhegan and Norridgewock Railway and Power	5.85	5.75		.10	5.85				5.85					
18	Somerset Traction	12.68	12.20		.48	12.68				12.68				.75	
19	Waterville and Fairfield Railway and Light	4.82	4.75		.07	4.82				4.82					
MARYLAND.															
	Total for state	437.84	258.78	176.43	2.63	437.84				431.92	5.92	1.19	8.24	163.35	51.47
1	United Railways	365.12	193.95	170.72	.45	365.12				365.12			8.24	125.00	40.00
2	Cumberland Electric Railway	7.07	6.95		.12	7.07				7.07					1.75
3	Frederick and Middletown	14.68	13.77		.91	14.68				8.76	5.92			13.68	1.00
4	Kensington Railway	2.53	2.50		.03	2.53				2.53				2.25	
5	Cumberland and Westernport	8.72	8.65		.07	8.72				8.72					8.72
6	Hagerstown Railway	13.70	13.40		.30	13.70				13.70				9.00	
7	Baltimore and Washington	2.00	2.00			2.00				2.00				.50	
8	Washington and Glen Echo	10.40	5.20	5.20		10.40				10.40		1.19		7.62	
9	Washington and Rockville	10.90	9.80	.51	.59	10.90				10.90				2.64	
10	Washington, Woodside and Forest Glen	2.72	2.66		.06	2.72				2.72				2.66	
MASSACHUSETTS.															
	Total for state	2,525.65	2,037.79	339.79	148.07	2,484.20		41.45		2,040.41	485.24	75.31	162.31	126.09	51.66
1	Amherst and Sunderland	14.87	14.13		.74	14.87				14.87			4.43	1.87	
2	Interstate Consolidated	27.64	24.63	1.60	1.41	27.64				27.64					
3	Lexington and Boston	33.21	29.63	.95	2.63	33.21				30.78	2.43	3.83	.83	1.25	
4	Old Colony Street Railway	379.26	329.85	32.30	17.11	379.26				359.63	19.73		2.18	5.46	
5	Boston and Northern	429.87	352.01	61.19	16.67	429.87				383.20	46.67	10.51	12.81	12.30	1.10
6	Boston Elevated Railway	406.13	195.57	163.60	146.96	390.11	3d rail.	1216.02		20.58	385.55	3.28		2.85	41.20
7	Lowell and Boston	9.64	9.12		.52	9.64				9.64		.14	.49	.43	
8	New York, New Haven and Hart-ford Railroad	39.33	19.04	15.54	4.75	13.90	3d rail.	25.43		39.33					
9	Blue Hill Street Railway	11.30	10.67		.63	11.30				11.30					
10	Hoosac Valley	18.70	18.10		.60	18.70				18.70			5.00	1.81	
11	Concord, Maynard and Hudson	13.07	12.47		.60	13.07				13.07		.35	.11	1.74	
12	Conway Electric Railway	6.35	5.91		.44	6.35				6.35				.50	
13	Cottage City and Edgartown	5.47	5.35		.12	5.47				5.47					
14	Norfolk Western Railway	9.45	9.08		.37	9.45				9.45					
15	Greenfield and Deerfield	7.90	7.80		.10	7.90				7.90			7.80	1.92	
16	Providence and Fall River	12.53	11.98		.55	12.53				12.53				3.19	
17	Dartmouth and Westport	9.84	9.31		.53	9.84				9.84		10.14		.15	
18	Fitchburg and Leominster	31.68	25.10	4.91	1.67	31.68				31.68			3.00	1.06	1.75
19	Framingham Union Street Railway	6.84	6.36		.48	6.84				6.84		.14			
20	Gardner, Westminster and Fitch-burg	16.05	15.68		.37	16.05				16.05					
21	Greenfield and Turners Falls	15.07	14.64		.43	15.07				15.07				3.66	
22	Haverhill and Southern New Hamp-shire	6.06	5.88		.18	6.06				6.06			6.06		
23	Haverhill, Georgetown and Danvers	6.02	5.87		.15	6.02				6.02		.52			
24	Haverhill and Amesbury	28.46	26.61		1.85	28.46				28.46		1.05	.20	.50	4.00
25	Holyoke Street Railway	43.70	33.52	7.07	3.11	43.70				42.70	1.00		3.38	8.67	
26	Lawrence and Reading	11.98	11.50	.12	.36	11.98				11.98		.92	.12	.31	
27	Lawrence and Methuen	6.46	6.28		.18	6.46				6.46		.23	6.46	1.04	
28	Middleton and Danvers	13.80	13.12	.34	.34	13.80				13.80		10.48	11.25	.18	
29	Norfolk and Bristol	21.05	20.57		.48	21.05				21.05			2.99	.07	
30	Marlboro Street Railway	15.80	15.09		.71	15.80				8.11	7.69			2.21	
31	Marlboro and Westboro	13.86	13.51		.35	13.86				13.86			.10	2.09	
32	Medfield and Medway	11.25	11.01		.24	11.25				11.25					
33	Middleboro, Wareham and Buz-zards Bay	22.22	21.35		.87	22.22				22.22		7.52	6.37	3.53	
34	Milford, Attleboro and Woonsocket	30.52	30.00		.52	30.52				30.52		.19		5.72	
35	Milford and Uxbridge	36.00	33.69	.99	1.32	36.00				36.00		.02	6.90	5.03	

1 For details see Supplementary Table 1.

2 For feeder conduit system see Supplementary Table 2.

3 Includes track within city limits for 3 companies. (See note 4.)

4 Includes track within city limits.

5 .25 mile of construction supported by houses.

6 Includes 4.47 miles not operated. (See note 8.)

7 This distinction not practicable for many companies.

GENERAL TABLES.

285

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.					FEEDER WIRE, MILES.		Number.		
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard.		Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.		Over-head.	Under-ground. ⁽²⁾
			Maximum.	Minimum.														
103.15	328.40					31	10,665	33	17	61.05	240.16	.50		1.71	299.75	449.28		1
7.99	5.12		60	40	T			2		.50	11.99		60		12.49	12.49		2
10.80			60	35	T, flat			1	1	8.70			52		8.70			3
5.72	21.59		56	56	Girder, T	2	200	1		13.12	13.13		52		26.25	26.25		4
	16.70		52	52	T	3	212	2			16.20		52		16.20	30.00		5
	5.40		60	60	T	1	54				4.52		52		4.52	10.00		6
8.15			90	50	Girder, T			1		1.00	6.61		50		7.61	7.00		7
7.10			56	48	T				2	1.25	5.75		52		7.00	4.00		8
2.25	2.12		60	56	T	2	300				4.12		52		4.12	1.00		9
3.00			16	16	T													10
1.58			60	60	T						1.57		52		1.57			11
17.00	39.18		60	48	T, girder	3	1,526	4		13.75	41.00		52		54.75	60.50		12
2.14			40	40	T				2	1.06	1.07		52		2.13	1.00		13
29.92	59.71		90	60	Girder, T	2	588	17		15.00	58.20	.50	52	.50	73.20	200.00		14
	15.70		60	56	T	8	5,240	1			15.50		50	1.00	14.50	14.50		15
	21.64		60	50	T	1	1,300		11		21.07		48	.21	20.86	21.64		16
	25.39		60	60	T	3	760	1		4.05	19.35		52		23.40	23.40		17
1.00	4.85		40	40	T	2	100	1		.75	5.00		52		5.75	5.00		18
1.68	11.00		58	40	T	3	375			.12	12.08		48		12.30	12.50		19
4.82			90	35	Girder, T	1	60	3	1	1.75	3.00		52		4.50	20.00		20
244.09	193.75					45	23,859	19	54	185.91	32.73	40.14		119.32	139.46	755.39		1
230.00	135.12		128	45	Girder, T, half groove.	25	21,000	12	47	158.72	1.50	38.73	45	119.00	74.95	653.80		2
5.20	1.87		60	45	Girder, T			3	1	6.95			35		6.95	4.00		3
1.00	13.68		60	60	Girder, T	7	1,850		2	6.00	7.77		44		13.77	42.00		4
.25	2.28		60	60	Girder, T	2	700				2.50		50		2.50			5
.55	8.17		92	60	Girder, T				2	.55	8.00		52		8.55	15.00		6
4.70	9.00		68	56	Girder, T			3	2	13.40			50		13.40	12.00		7
.50	1.50		80	60	T, groove	1	50				2.00		52		2.00	1.50		8
1.30	9.10		70	42	T	8	197			4.88		.32	42	.32	4.88	8.55		9
.59	10.31		70	70	T	2	62			.41	8.30	1.09	52		9.80	15.65		10
	2.72		70	70	T			1			2.66		40		2.66	2.99		11
(7)	(7)	47.95				232	32,594	257	25	712.85	1,276.74	29.96		294.91	1,724.64	3,046.88	336.65	1
3.00	11.87		60	56	T	9	400	1		1.00	13.13		52		14.13	16.00		2
			90	50	T, girder			2	3	5.14	19.49		50	1.17	23.46	18.75		3
			95	56	T, girder	3	54	2		.30	29.33		50		29.63	27.22		4
147.25	232.01		95	85	Girder, flat	16	3,317	18		101.16	228.69		55	12.90	316.95	634.10	.54	5
230.79	199.08	11.25	95	35	Girder, flat	14	1,901	109		168.34	182.53	1.14	52	31.11	320.90	434.00		6
362.08	44.05	36.50	125	35	Girder, T, groove, full groove, flat.	1	8,554	59		176.00		12.93	45	134.93	54.00	502.58	246.40	7
1.68	7.96		93	70	T, girder	3	474			.43	8.69		52		9.12	10.00		8
												6.95	60		6.95	8.00		9
	11.30		90	56	T, girder	1	40	1		.63	10.04		52		10.67	10.50		10
5.40	13.30		95	56	T, girder, full groove.	5	270	5		1.55	16.55		48		18.10	28.00		11
1.88	11.19		90	56	T, girder	4	475	2		1.00	11.47		50		12.47	13.00		12
1.00	5.35		60	60	T	3	686	1		1.50	4.41		52		5.91	5.00		13
			50	25	T						5.35		52		5.35	5.00		14
			90	65	T, girder						9.08		52	1.00	8.08	16.50		15
1.80	6.10		60	60	T					.50	7.30		50		7.80	4.00		16
1.00	11.53		60	60	T	7	650				11.98		52		11.98	14.00		17
			70	70	T	1	195		1	.42	8.99		52		9.31	31.00		18
			96	58	T, girder	2	154	1	5	9.00	15.60	.50	52	.25	24.85	15.00		19
2.00	4.84		58	35	T			2		1.12	5.24		50		6.36	2.00		20
5.00	11.05		60	45	T	3	80	5		.39	15.29		50		15.68	14.00		21
3.73	11.34		60	48	T	2	800	1		1.00	13.64		50		14.64	10.00		22
			60	60	T					.38	5.50		52	.38	5.50	6.00		23
4.00	2.02		90	48	Girder, T	1	500	1		1.36	4.51		50		5.87	9.00		24
6.68	21.78		90	35	T, girder	1	20		1	4.15	22.46		52	2.00	24.61	50.70		25
25.84	17.86		107	56	T, girder	1	40	4		28.70	4.82		32		33.52	65.00		26
1.00	10.98		90	60	T, girder	2	87	1		.97	10.53		44		11.50	8.90		27
3.50	2.96		70	60	T, girder					2.00	4.28		52	2.00	4.28	8.25		28
4.78	9.02		75	60	T	1	150				13.12		52		13.12	14.61		29
			90	56	T, girder	1	50			.48	20.09		52		20.57	22.50		30
6.50	9.30		90	38	T, girder			1			15.09		50		15.09	21.00		31
1.40	12.46		90	60	T, girder				3	.75	12.76		50		13.51	11.00		32
			90	65	T, girder	1	80	1			11.01		52		11.01	13.00		33
	22.22		75	60	T	9	1,587	1			21.35		55	.50	20.85	45.00		34
4.00	26.52		60	60	T, girder			1		.50	29.50		52	.50	29.50	38.50		35
3.40	32.20		90	48	T, girder	7	700	2	1	2.90	30.79		52		33.69	37.00		36

¹ Includes 16.02 miles elevated and 4.47 miles not operated.² Includes 6.64 miles elevated.³ Includes 6.47 miles elevated.⁴ Includes 2.91 miles elevated.⁵ Elevated.⁶ Includes 2.93 miles leased from Newtonville and Watertown.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.
MASSACHUSETTS—Continued.															
36	Natick and Cohituate.	18.80	17.20	.85	.75	18.80				18.80			.66		
37	South Middlesex Street Railway.	19.67	18.70		.97	19.67				13.85	5.82		.02	.27	.19
38	Union Street Railway.	30.44	24.11	3.44	2.89	30.44				21.86		.20	.76		
39	New Bedford and Onset.	21.86	16.14	3.65	2.07	21.86				21.86				6.10	
40	Citizens Electric Railway.	23.08	21.86		1.22	23.08				23.08		.57			1.67
41	Georgetown, Rowley and Ipswich.	18.18	17.92		.26	18.18				18.18		.61		.25	
42	Commonwealth Avenue.	13.37	6.82	5.56	.99	13.37				13.37		.55			
43	Wellesley and Boston.	4.90	4.69		.21	4.90				4.90		3.76			
44	Newton and Boston.	11.52	10.76		.76	11.52				9.79	1.73	3.70			
45	Newton Street Railway.	15.76	14.62	.40	.74	15.76				15.76		3.60			
46	Northampton Street Railway.	26.26	24.37		1.89	26.26				26.26				4.08	
47	Northampton and Amherst.	14.84	13.94		.90	14.84				14.84			.32	.98	
48	Haverhill and Andover.	1.80	1.80			1.80				1.80			1.80		
49	Norton and Taunton.	29.83	29.00		.83	29.83				29.83		.41			
50	Athol and Orange.	7.32	6.88		.44	7.32				7.32					
51	Pittsfield Electric.	21.18	19.83	.75	.60	21.18				21.18			5.50	1.56	
52	Plymouth and Sandwich.	6.36	6.15		.21	6.36				6.36			1.73		
53	Brockton and Plymouth.	23.80	22.09		1.71	23.80				23.80			.12		
54	Norwood, Canton and Sharon.	6.15	6.04		.11	6.15				6.15					
55	Shelburne Falls and Coleraine.	7.01	6.53		.48	7.01				7.01				2.55	
56	Southbridge and Sturbridge.	8.01	7.60	.15	.26	8.01				8.01					
57	Hampshire Street Railway.	4.57	4.34		.23	4.57				4.57			4.57	2.39	
58	Springfield Street Railway.	92.03	64.91	20.85	6.27	92.03				92.03			18.40	3.24	
59	Springfield and Eastern.	30.46	28.57		2.09	30.46				30.46				6.10	
60	Stoughton and Randolph.	7.76	7.70		.06	7.76				7.76		.49	.40		
61	East Taunton Street Railway.	10.70	10.53		.17	10.70				10.70		.72	.01		
62	Bristol County.	16.67	15.99		.68	16.67				16.67		.69		4.00	
63	Templeton Street Railway.	18.39	17.87		.52	18.39				10.98	7.41				
64	Martha's Vineyard.	1.10	1.10			1.10				1.10				1.00	
65	Upton Street Railway.	2.66	2.62		.04	2.66				2.66					
66	Reading, Wakefield and Lynnfield.	3.03	2.98		.05	3.03				3.03		1.08	3.03	.50	
67	Hampshire and Worcester.	12.12	11.71		.41	12.12				12.12			6.66	.49	
68	Warren, Brookfield and Spencer.	20.10	19.61		.49	20.10				20.10				.08	
69	Webster and Dudley.	6.09	5.88		.21	6.09				6.09			.20	.87	
70	Woronoco Street Railway.	12.25	11.36	.34	.55	12.25				12.25			1.20	.53	
71	Linwood Street Railway.	.66	.64		.02	.66				.66		*1.24	.49	.66	
72	Worcester Consolidated.	131.98	110.67	15.19	6.12	131.98				126.39	5.59	.49	9.52	9.88	1.75
73	Worcester and Blackstone Valley.	16.36	15.74		.62	16.36				16.36		1.13	5.26	.84	
74	Worcester and Southbridge.	21.67	19.38		2.29	21.67				20.05	1.62	4.38	21.67	11.53	
75	Worcester and Webster.	15.53	14.91		.62	15.53				15.53		2.37		.35	
MICHIGAN.															
Total for state.		1,022.81	810.22	157.41	55.18	985.89		*36.92		1,022.81		34.85	16.45	301.61	20.27
1	Adrian Street Railway.	4.06	4.00		.06	4.06				4.06					
2	Bay Cities Consolidated.	23.30	20.06	1.84	1.40	23.01	Conduit	.29		23.30				1.40	
3	Benton Harbor and St. Joseph.	10.50	8.00	2.25	.25	10.50				10.50				.33	
4	Detroit United Railway.	381.30	264.70	91.26	25.34	381.30				381.30			1.84	93.50	.75
5	Detroit and Port Huron Shore Line.	107.37	93.73	5.00	8.64	107.37				107.37		25.00		48.87	
6	Detroit, Ypsilanti, Ann Arbor and Jackson.	91.42	87.86		3.56	91.42				91.42				38.00	
7	Escanaba Electric Railway.	7.61	6.91		.70	7.61				7.61				1.64	.40
8	Grand Rapids Railway.	55.86	32.06	22.67	1.13	55.86				55.86			2.89	7.30	1.58
9	Grand Rapids, Grand Haven and Muskegon.	45.88	44.55		1.33	9.25	3rd rail.	36.63		15.88		6.75		35.30	
10	Grand Rapids, Holland and Lake Michigan.	69.00	42.00	26.00	1.00	69.00				69.00				39.00	
11	Houghton County Street Railway.	22.16	18.86	3.00	.30	22.16				22.16					14.22
12	Twin City General Electric.	4.60	4.49		.11	4.60				4.60				.24	
13	Negaunee and Ishpeming.	4.69	4.50		.19	4.69				4.69					2.00
14	Jackson and Suburban Traction.	20.66	19.50	.63	.53	20.66				20.66			9.72	4.88	
15	Michigan Traction.	43.80	42.50	.66	.64	43.80				43.80			2.00	4.04	
16	Lansing City Electric.	7.90	7.30		.60	7.90				7.90				2.00	
17	Manistee, Filer City and Eastlake.	15.00	14.00		1.00	15.00				15.00					
18	Marquette and Presque Isle.	7.00	6.74		.26	7.00				7.00					.75
19	Menominee Light, Railway and Power.	6.71	6.60		.11	6.71				6.71					
20	Toledo and Monroe.	21.92	21.40		.52	21.92				21.92				18.45	
21	Muskegon Traction and Lighting.	15.20	12.89	.30	2.01	15.20				15.20				.02	
22	Detroit, Plymouth and Northville.	17.00	14.75		2.25	17.00				17.00					
23	Owosso and Corunna Electric.	4.32	4.12		.20	4.32				4.32					
24	Saginaw Valley Traction.	35.55	28.70	3.80	3.05	35.55				35.55		3.10		7.21	
MINNESOTA.															
Total for state.		338.17	189.64	128.77	19.76	338.17				338.17				13.11	.47
1	Interstate Traction.	3.14	3.03		.11	3.14				3.14					
2	Duluth-Superior Traction.	70.70	38.24	30.70	1.76	70.70				70.70					.47
3	Twin City Rapid Transit.	251.02	136.41	97.54	17.07	251.02				251.02				18.00	
4	Benton Power and Traction.	8.66	7.46	.53	.67	8.66				8.66					
5	Winona Railway and Light.	4.65	4.50		.15	4.65				4.65				.11	

* For details see Supplementary Table 1.

* For feeder conduit system see Supplementary Table 2.

GENERAL TABLES.

287

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.					FEEDER WIRE, MILES.		Number.	
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi. Mini. mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.		Under- ground. (2)
5.82	13.85		70	58	T			2	1.00	16.20		52		17.20	9.00		36
24.14	6.30		96	45	T	4	150	3	1.25	17.45		44		18.70	47.00		37
3.86	18.00		118	60	T			2	15.85	7.71	.56	52	9.75	14.36	30.20	15.00	38
8.99	14.09		80	70	T	1	60	1	5.79	10.35		52	2.04	14.10	33.50		39
1.00	17.18		110	40	T	2	100	1	4.18	17.68		55		21.86	73.00		40
13.37			75	60	T	2	325	1	1.00	16.92		52		17.92	23.00		41
4.90			95	56	T				.56	.56	5.70	52		6.82	5.47		42
11.52			95	56	T				2.29	2.40		50	1.59	3.10	5.05		43
15.76			95	56	T				2.56	8.20		50	2.63	8.13	8.25		44
21.35	4.91		95	56	T				11.23	3.39		50	.46	14.16	11.93		45
5.09			110	58	T	4	293	1	24.37			52	1.00	23.37	29.00		46
	9.75		65	56	T	4	1,338	1	1.00	12.94		52		13.94	8.00		47
	1.80		90	60	T				1.80			52		1.80	1.80		48
3.50	26.33		90	56	T	5	128	1	29.00			50		29.00	32.00		49
3.33	3.99		90	50	T				2.50	4.38		52		6.88	7.00		50
7.00	14.18		90	60	T	9	160		18.33	1.50		58	.96	18.88	17.00	.08	51
	6.36		66	60	T					6.15		60		6.15	4.00		52
1.50	22.30		66	60	T					22.09		50		22.09	75.00		53
	6.15		90	60	T	3	60		.50	5.54		50		6.04	4.00		54
	7.01		90	90	T	2	135		.48	6.05		52		6.53	6.50		55
2.00	6.01		67	65	T	1	70	1	.59	7.01		60		7.60	14.00		56
	4.57		60	60	T	1	33			4.34		52		4.34	6.00		57
47.44	44.59		107	58	T	5	75	3	50.00	12.72	2.19	52	39.91	25.00	100.00	74.63	58
					groove, full												
7.00	23.46		90	56	T	6	540	1	5.00	23.37		50	.80	27.57	27.50		59
			90	56	T				.06	7.64		50		7.70	4.00		60
6.92	3.78		90	60	T	1	40	1		10.53		50		10.53	21.00		61
3.00	13.67		90	56	T	2	2,000	1	.69	15.30		55		15.99	24.00		62
5.18	13.21		90	60	T	2	70		.52	17.35		52		17.87	18.54		63
	1.10		40	40	T	1	550			1.10		50		1.10	.50		64
.75	1.91		60	60	T				.06	2.56		52		2.62			65
1.00	2.03		90	60	T	1	35			2.98		53		2.98	2.98		66
3.00	9.12		90	60	T	31	210	1	1.00	10.71		50		11.71	9.00		67
7.00	13.10		70	18	T	9	130	1	.57	19.04		60		19.61	40.00		68
5.00	1.09		80	60	T	2	110	2	.75	5.13		60		5.88	6.88		69
7.24	5.01		60	55	T	4	590		3.36	8.00		52		11.36	8.00		70
			78	70	T			1	.64			52		.64	1.00		71
60.88	71.10	.20	95	48	T	14	2,288	12	51.99	59.17		48	49.04	62.12	129.96		72
10.03	6.33		72	70	T	6	540	1	1.00	14.74		60		15.74	14.00		73
2.09	19.67		70	70	T	11	1,200		1.52	17.86		66		19.38	6.00		74
2.35	13.18		60	60	T	1	50	2	14.91			60		14.91	13.81		75
464.19	558.62					94	19,719	186	93	383.97	354.51	26.34	169.45	605.37	1,363.30	4.60	
4.06			60	35	T			3	3.00	1.00		53		4.00			1
23.30			60	35	T			5	20.06			50	.25	19.81	26.00	.25	2
9.00	1.50		73	45	Girder, T			2	7.67	.33		50		8.00	5.00		3
185.00	186.30		98	60	Girder, groove, T	9	2,860	66	148.40	113.96	2.34	50	150.00	114.70	749.00	4.25	4
32.37	75.00		70	60	T	10	2,109	3	17.98	75.75		46	2.45	91.28	84.00		5
11.40	80.02		90	40	Girder, T	2	256	1	11.40	76.46		50	6.00	81.46	80.00		6
5.75	1.86		60	35	Girder, T	1	16	3	6.42	.49		52		6.91			7
46.99	8.87		98	35	Girder, full groove, T	1	600	37	32.06			53	5.00	27.06	100.00		8
10.08	35.80		70	70	T	17	3,428	2	8.65	.50		44		9.15	6.25		9
5.00	64.00		68	56	T	13	1,290	6	18.00		24.00	52		42.00	195.00		10
4.64	17.52		60	60	T	7	385		9.60	9.26		52	4.00	14.86	30.00		11
4.60			45	45	T	1	1,000	4	4.49			52		4.49	1.02		12
4.44	.25		45	30	Girder, T	1	30	3	4.50			52		4.50	2.00		13
8.96	11.70		70	40	T	3	648	2	7.00	12.50		57	1.75	17.75	1.00		14
16.63	27.17		90	45	Girder, T	11	1,637	11	19.31	23.19		55		42.50	8.00		15
5.90	2.00		80	35	T			1	5.30	2.00		52		7.30	3.00		16
6.00	9.00		48	48	T			8	14.00			45		14.00	8.00	.10	17
7.00			56	40	Girder	1	740	1	6.74			53		6.74	2.25		18
6.71			40	40	T			3	6.60			52		6.60	3.50		19
6.00	15.92		100	56	T	8	2,370	7	2.87	18.53		48		21.40	19.28		20
15.20			70	30	T	1	10	3	12.89			52		12.89	15.00		21
3.50	13.50		80	40	T	3	325	3	2.25	12.50		53		14.75	12.00		22
3.32	1.00		90	35	T			2	3.48	.64		52		4.12			23
28.34	7.21		88	35	Girder, T	5	2,065	29	21.30	7.40		55		28.70	13.00		24
323.61	14.56	89.57				2	1,360	73	127.26	1.69	60.69	109.36	80.28	213.77	.50		
3.14			30	30	T				3.03			35		3.03	4.00		1
70.70		.97	80	35	T	1	60	32	36.76	1.29	.19	85	4.36	33.88	46.44		2
238.00	13.02	84.50	40	45	Girder, T, groove			41	75.91		60.50	50	104.00	32.41	156.00	.50	3
7.12	1.54		40	40	T			9	7.46			52		7.46	7.33		4
4.65		4.10	40	40	T	1	1,300	1	4.10	.40		42	1.00	3.50			5

¹Track of steam railroad.²Includes .29 mile of conduit trolley and 36.63 miles of third rail.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.																	
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Siding and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—			
			First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.		
MISSISSIPPI.																	
	Total for state	25.30	23.74	.57	.99	25.30				25.30			4.52	.64	.10		
1	Greenville Light and Car.	1.00	.81		.19	1.00				1.00							
2	Jackson Railway, Light and Power.	5.34	4.46	.57	.31	5.34				5.34				.12			
3	Meridian Light and Railway	5.71	5.50		.21	5.71				5.71				.50			
4	Natchez Railway and Power	4.50	4.47		.03	4.50				4.50			4.50				
5	Vicksburg Railroad, Power and Manufacturing.	8.75	8.50		.25	8.75				8.75			.02	.02	.10		
MISSOURI.																	
	Total for state	758.38	453.61	296.39	8.38	719.48		33.00	5.90	397.49	360.89	7.10	17.73	125.56	3.31		
1	Citizens Street Railway.	1.75	1.75						1.75	1.75							
2	Carrollton Electric Railway	1.88	1.50		.38	1.88				1.88			.13	.48			
3	Clinton Street Railway	1.35	1.25		.10				1.35	1.35							
4	Hannibal Railway and Electric	4.25	4.00		.25	4.25				4.25					.11		
5	Southwest Missouri Electric Railway	36.61	30.97	5.14	.50	36.61				36.61				15.00			
6	Metropolitan	181.24	90.12	90.12	1.00	148.24	Cable	33.00		181.24			14.55	10.77			
7	Missouri Water, Light and Traction	4.12	3.95		.17	4.12				4.12					.20		
8	St. Joseph Railway, Light, Heat and Power.	35.15	22.50	12.20	.45	35.15				35.15			1.75	3.05			
9	St. Louis Transit	360.89	208.99	150.66	1.24	360.89					360.89		1.30	40.41			
10	St. Louis and Suburban	36.82	24.32	12.50		36.82				36.82				21.26			
11	St. Louis and Meramec River	28.19	14.33	13.86		28.19				28.19		7.10		3.36			
12	St. Louis and Kirkwood	24.97	16.86	8.11		24.97				24.97				16.97			
13	St. Louis, St. Charles and Western	16.00	12.75		3.25	16.00				16.00				13.00	3.00		
14	Railway and Electric of Sedalia	6.06	5.72		.34	6.06				6.06				1.06			
15	Kickapoo Transit	2.80	2.60		.20				2.80	2.80							
16	Springfield Traction	16.30	12.00	3.80	.50	16.30				16.30				.20			
MONTANA.																	
	Total for state.	63.21	55.19	7.17	.85	63.21				63.21			1.10	7.42	1.00		
1	Anaconda Copper Mining	6.75	6.40		.35	6.75				6.75							
2	Bozeman Street Railway	2.50	2.50			2.50				2.50							
3	Butte Electric Railway	24.96	18.79	6.17		24.96				24.96			.85	3.42			
4	Great Falls Street Railway	11.90	10.50	1.00	.40	11.90				11.90			.25		1.00		
5	Helena Power and Light	17.10	17.00		.10	17.10				17.10				4.00			
NEBRASKA.																	
	Total for state	113.66	66.08	42.13	5.45	110.55			3.11	113.66			3.00	2.33			
1	Lincoln Traction	37.00	26.58	7.00	3.42	37.00				37.00				2.33			
2	Nebraska City Street Railway	3.11	3.00	.10	.01				3.11	3.11							
3	Omaha Street Railway	72.00	35.00	35.00	2.00	72.00				72.00			3.00				
4	Metropolitan Cable Railway	1.55	1.50	.03	.02	1.55				1.55							
NEW HAMPSHIRE.																	
	Total for state	167.65	155.03	5.29	7.33	167.65				111.43	56.22		5.60	4.48	.07		
1	Concord Street Railway	12.71	11.61		1.10	12.71				12.71			.73	.50	.07		
2	Chester and Derry	7.85	7.75		.10	7.85				7.85				1.25			
3	Exeter, Hampton and Amesbury	77.83	75.38		2.45	77.83				21.61	56.22			.81			
4	Keene Electric Railway	6.52	6.28		.24	6.52				6.52							
5	Laconia Street Railway	8.87	8.36		.51	8.87				8.87							
6	Manchester Street Railway	34.59	27.31	5.29	1.99	34.59				34.59			3.00	1.20			
7	Portsmouth Electric Railway	19.28	18.34		.94	19.28				19.28			1.87	.72			
NEW JERSEY.																	
	Total for state	861.28	573.57	259.62	28.09	858.66		1.40	1.22	623.37	237.91	7.30	40.41	97.04	1.09		
1	West Jersey and Seashore.	19.03	8.71	8.71	1.61	19.03				19.03				2.00			
2	Bridgeton and Millville	35.00	34.00		1.00	35.00				35.00			12.00	5.00			
3	Brigantine Transportation	7.75	6.50	1.13	.12	7.75				7.75							
4	Camden, Gloucester and Woodbury	21.77	13.35	7.91	.51	21.77				21.77		3.01		10.27			
5	Camden and Suburban	67.81	40.84	26.61	.36	67.81				37.70	30.11		15.97		1.49		
6	Cape May, Delaware Bay and Sewells Point.	12.43	7.81	1.72	2.90	12.43				12.43				2.50			
7	Elizabeth, Plainfield and Central Jersey.	60.00	40.00	19.00	1.00	60.00				60.00			1.50				
8	New Jersey and Hudson River Railway and Ferry.	15.60	11.92	3.22	.46	15.60				15.60				2.17	3.80		
9	Jersey City, Hoboken and Paterson.	139.27	89.55	49.22	.50	139.27				139.27		1.29	2.50	15.79			
10	North Jersey Street Railway	247.58	125.83	110.32	11.43	247.58				45.51	202.07			4.39			
11	Jersey Central Traction.	3.12	3.00		.12					3.12							
12	Monmouth County Electric.	10.16	8.56		1.60	10.16				10.16				1.50			
13	Atlantic Coast Electric Railroad.	23.68	14.36	8.63	.69	23.68				17.95	5.73			10.06			
14	Millville Traction.	13.34	12.78		.56	13.34				13.34				3.38			
15	Mt. Holly Street Railway	1.22	1.20		.02				1.22	1.22							
16	Middlesex and Somerset	50.00	44.30	4.30	1.40	50.00				50.00				8.50			
17	Ocean City Electric Railroad	7.50	7.25		.25	7.50				7.50							
18	Orange and Passaic Valley	9.89	9.14		.75	9.89				9.89				1.50			
19	South Orange and Maplewood.	5.40	2.60	2.60	.20	5.40				5.40				4.90			

For details see Supplementary Table 1.

GENERAL TABLES.

289

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAIL-ROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi- mum. Min- imum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over-head.	Under-ground. (%)	
22.97	2.33				8	322	1	7	18.28	4.89	.57			23.74	7.59		
1.00			70	70	T				.81			52		.81	.28		1
4.31	1.33		75	50	T			4		3.89	.57	39		4.46	1.23		2
5.71			70	30	Girder, T	5	160		4.50	1.00		50		5.50	3.08		3
1.50			60	35	T			3	4.47			50		4.47	1.00		4
7.75	1.00		56	45	T	3	162	1	8.50			52		8.50	2.00		5
619.61	138.77	376.07			93	20,918	19	64	378.39	23.38	29.24		164.31	266.70	949.11	18.32	
1.75			32	32	T												1
.75	1.13		56	52	T	4	475		1.50			53		1.50	2.22		2
1.35			35	35	T			1									3
4.25			90	45	T, girder	4	72		4.00			44		4.00	2.00		4
24.00	12.61		80	48	Girder, T	10	1,949		30.97			45		30.97	128.00		5
170.50	10.74	85.00	106	45	Girder, T	19	14,137	1	70.12		3.00	62	34.12	39.00	75.00		6
4.12			62	52	T	1	20		3.95			52		3.95			7
31.87	3.28		85	60	Girder, T	3	115	5	21.38	1.12		44		22.50	19.00		8
316.95	43.94	283.87	117	40	Girder, T	28	2,018	7	186.15	8.71	14.13	50	111.75	97.24	545.60	18.32	9
15.55	21.27	7.20	94	40	Girder, T	6	285	1	20.56	.70	3.06	55	8.70	15.62	98.04		10
21.16	7.03		80	60	Girder	3	600	4	8.78		5.55	65	9.24	5.09	28.34		11
6.58	18.39		80	73	Girder, T	10	520	1	13.86		3.00	55		16.86	20.91		12
	16.00		80	56	T, girder	8	700		.50	11.75	.50	44	.50	12.25	16.00		13
5.00	1.06		35	30	T	2	27	2	5.72			87		5.72	4.00		14
1.12	1.68		56	40	Girder, T												15
14.66	1.64		45	30	Girder, T			8	10.90	1.10		46		12.00	10.00		16
42.63	20.58				7	615		19	47.76	6.93	.50			55.19	50.64		
3.35	3.40		60	36	T	1	40		4.97	1.43		53		6.40	6.00		1
2.50			36	36	T			4	2.00	.50		50		2.50	2.50		2
12.88	12.08		72	35	T	5	525	13	14.79	3.50	.50	50		18.79	14.64		3
10.90	1.00		68	40	Girder, T			2	9.00	1.50		44		10.50	10.50		4
13.00	4.10		45	40	T, girder	1	50		17.00			50		17.00	17.00		5
100.66	13.00				15	756	1	15	63.08				6.00	57.08	58.00		
24.00	13.00		72	35	T, girder	15	756	1	26.58			40		26.58	40.00		1
3.11			40	20	Girder, T			5									2
72.00			73	15	Girder, T			9	35.00			50	6.00	29.00	18.00		3
1.55			35	35	T			1	1.50			44		1.50			4
81.66	85.99				9	6,285	16	9	30.78	123.25	1.00		3.85	151.18	264.36		
12.71			90	35	Girder, T			1	5.00	6.61		52	1.00	10.61	10.00		1
7.85			50	50	T				.50	7.25		50		7.75	11.00		2
19.00	58.83		60	45	T, groove	4	5,405	7		75.38		52		75.38	183.00		3
1.00	5.52		90	70	Girder, T	2	130	2	.24	6.04		50		6.28	6.50		4
8.87			60	40	T			2	6.36	2.00		42		8.36	8.36		5
24.00	10.59		90	56	Girder, T	1	50	2	17.31	9.00	1.00	52	2.20	25.11	30.00		6
8.23	11.05		90	60	Girder, T	2	700	2	1.37	16.97		55	.65	17.69	15.50		7
666.48	194.80	65.20			88	25,940	85	28	138.19	121.59	11.84		191.46	380.16	900.29	19.71	
3.55	15.48		86	60	Girder, T			2			8.71	43	8.71	8.71	8.71		1
12.00	23.00		60	45	T	7	283	1	8.00	26.00		53		34.00	37.00		2
7.75			52	52	T	1	5,280	1		6.50		35		6.50	6.50		3
11.50	10.27		70	56	Girder, T	3	2,267	3	11.13	2.22		42		13.35	14.86		4
37.98	29.83	4.20	90	55	Girder, T	5	310	20	40.84			43	.62	40.22	67.00		5
8.00	4.43		56	35	T				7.81			43		7.81	3.50		6
60.00			90	56	Girder, T	2	1,500	1	40.00			45	27.75	12.25	52.00		7
11.80	3.80		80	60	Girder, T	9	2,537		9.58	2.34		50	.76	11.16	47.82	.15	8
123.48	15.79	16.00	109	40	Girder, T	5	1,150	10	87.78	.48	1.29	52	21.61	67.94	143.19		9
247.58		45.00	109	50	Girder, groove, T	1	3,615	25	124.58	1.25		44	120.44	5.39	271.97	19.56	10
3.12			70	60	Girder, T	2	75		1.75	1.25		42		3.00			11
3.00	7.16		90	65	Girder, T	4	950	5	6.43	2.13		42	.19	8.37	14.50		12
23.68			73	60	Girder	9	4,925	3	11.88	2.24	.24	44	1.33	13.03	13.60		13
3.63	9.71		90	48	Girder, T	3	364	3	2.85	9.93		43		12.78	11.27		14
1.22			50	50	Girder			1									15
41.50	8.50		70	60	Girder, T			2	23.84	20.46		42		44.30	90.40		16
7.50			65	45	Girder, T				7.12	.13		43		7.25	7.25		17
9.89			84	54	Girder, groove, T	3	60	3	8.64	.50		45	4.75	4.39	12.50		18
5.40			96	56	T, girder	1	12		2.00		.60	70	.75	1.85			19

¹For feeder conduit system see Supplementary Table 2.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by com-pany.	Not owned by com-pany.
NEW JERSEY—Continued.															
20	Raritan Traction	9.06	8.70		.36	9.06				9.06			5.77	.87	
21	Point Pleasant Traction, Electric Light and Power	2.28	2.13		.15	2.28				2.28					
22	Newark and Hackensack	14.87	10.97	3.49	.41	14.87				14.87				1.66	
23	Trenton Street Railway	43.60	31.17	11.74	.69	43.60				43.60			2.00	4.00	
24	Camden and Trenton	29.50	28.56	.37	.57	29.50				29.50		1.50		5.50	
25	Trenton, Lawrenceville and Princeton.	10.02	9.59		.43	10.02				10.02				10.02	
26	Orange Mountain Traction	1.40	.75	.65			Cable	1.40		1.40				1.40	
NEW MEXICO.															
	Total for territory	2.10	2.00		.10				2.10	2.10					
1	Albuquerque Street Railroad.	2.10	2.00		.10				2.10	2.10					
NEW YORK.															
	Total for state.	*2,818.97	1,822.31	847.41	149.25	*2,289.18		*414.62	115.17	2,296.31	522.66	91.20	136.87	373.05	34.21
1	Albany and Hudson Rwy. and Power	42.44	37.35		5.09	2.66	3d rail	39.78		42.44				40.10	
2	United Traction	75.83	44.66	30.27	.91	74.83			1.00	66.76	9.07	2.06		2.50	.25
3	Hudson Valley Railway	110.73	100.47	3.58	6.68	110.73				110.73		23.37	19.60	76.78	
4	Troy and New England	10.00	8.90		1.10	10.00				10.00				9.90	
5	Amsterdam Street Railroad	5.73	5.38		.35	5.73				5.73					1.22
6	Auburn City Railway	12.01	10.87	.40	.74	12.01				12.01		.50		1.50	
7	Auburn Interurban Electric	7.11	6.71		.40	7.11				7.11					
8	Ballston Terminal Railroad	15.00	12.00		3.00	15.00				15.00			2.50	9.00	
9	Binghamton Railway	36.76	28.71	6.55	1.50	36.76				36.76				2.50	
10	International Railway	222.71	145.62	59.12	17.97	222.71				199.91	*22.80	3.11		11.00	23.00
11	Crosstown Street Railway	97.77	51.72	44.80	1.25	97.77				97.77					
12	Buffalo and Depew	14.71	7.25	7.25	.21	14.71				14.71				5.00	
13	Buffalo, Hamburg and Aurora	13.75	13.55		.20	13.75				13.75				1.00	
14	Ontario Light and Traction	3.00	2.75		.25	3.00				3.00					
15	Catskill Electric Railway	2.90	2.75		.15	2.90				2.90					
16	Cohoes City Railway	6.35	6.12		.23	6.35				6.35					
17	Cortland County Traction	10.04	9.76		.28	10.04				10.04			.13	2.77	
18	Corning and Painted Post	5.90	5.30		.60	5.90				5.90				.25	
19	Dunkirk and Fredonia	3.75	3.51		.24	3.75				3.75					
20	Dunkirk and Point Gratiot	3.25	3.00		.25	3.25				3.25					.40
21	Elmira Water, Light and Railroad	27.24	23.15	2.30	1.79	27.24				14.17	13.07				.50
22	Ocean Electric Railway	1.04	1.02		.02	1.04				1.04					
23	Citizens Street Railway	7.00	6.80		.20	7.00				2.95	4.05				.50
24	Fonda, Johnstown and Gloversville	19.01	18.61		.40	19.01				19.01				4.01	
25	Lake Ontario and Riverside	1.04	1.00		.04				1.04	1.04					
26	Geneva, Waterloo, etc., Traction	17.75	17.00		.75	17.75				17.75				1.62	
27	Mountain Lake Electric	4.50	4.35		.15	4.50				4.50				3.61	
28	Bennington and Hoosick Valley	16.52	16.00		.52	16.52				16.52				4.00	
29	Hornellsville Electric Railway	5.07	4.85		.22	5.07				5.07					
30	Hornellsville and Canisteo	4.33	4.32		.01	4.33				4.33		1.00		3.44	
31	Huntington Railroad	3.19	3.04		.15	3.19				3.19					
32	Ithaca Street Railway	7.68	7.33		.35	7.68				7.68					1.25
33	Jamestown Street Railway	20.78	16.10	4.68		20.78				20.78				.75	
34	Kingston Consolidated	9.16	7.98		1.18	9.16				9.16				.50	
35	Lewiston and Youngstown Frontier	8.70	8.50		.20	8.70				8.70				6.75	
36	Lima-Honeoye Light and Railroad	5.16	4.46		.70	5.16				5.16				4.46	
37	Middletown-Goshen Electric	12.84	11.74		1.10	12.84				12.84				6.00	
38	New York and Long Island Traction	9.00	8.50		.50	9.00				9.00			8.50		
39	Orange County Traction	16.49	14.29	1.00	1.20	16.49				16.49				1.00	
40	New Paltz and Poughkeepsie	9.27	9.02		.25	9.27				9.27					
41	Interurban	198.74	100.94	97.78	.02	3.68	Conduit	131.13	63.93	1.59	197.15	2.09			
42	Central Crosstown	8.07	3.73	3.92	.42				8.07	4.15	3.92	5.93			
43	Fulton Street Railroad	1.06	.39	.66					1.06	1.06		.84			
44	Thirty-fourth Street Crosstown	.97	.48	.49			Str. bat.	.97		.97		4.63			
45	Twenty-eighth and Twenty-ninth Street Crosstown	6.73	3.37	3.36					6.73	6.73		.88			
46	Third Avenue Railroad	27.24	13.28	13.28	.68		Conduit	27.24		27.24		.18			
47	Forty-second Street, Manhattanville and St. Nicholas Avenue	25.66	12.83	12.83			Conduit	14.27	11.39	25.66		5.13			
48	Dry Dock, East Broadway and Battery	14.97	7.16	7.15	.66				14.97	14.97		5.46			
49	Kingsbridge Railway	6.25	3.13	3.12			Conduit	6.25		6.25				6.25	
50	Southern Boulevard Railroad	7.00	3.50	3.50		7.00				7.00					
51	Yonkers Railroad	28.77	26.06	2.01	.70	28.77				28.77		2.50	4.50		
52	Union Railway	71.10	39.36	31.74		71.10				71.10					
53	Tarrytown, White Plains and Maroonneck	18.69	18.00		.69	18.69				18.69					
54	Westchester Electric Railroad	31.05	25.13	5.92		31.05				31.05		7.17	1.00		
55	Manhattan Railway (elevated)	117.14	37.68	752.87	26.59		Steam	* 117.14		117.14			1.49	11.79	.92
56	Pelham Park Railroad	1.50	1.40		.10				1.50	1.50					
57	City Island Railroad	2.00	1.80		.20				2.00	2.00					
58	Brooklyn Rapid Transit	524.34	249.19	240.52	34.63	* 452.74	3d rail	10 71.60		319.42	204.92	2.37	2.77	6.25	
59	Coney Island and Brooklyn	48.30	24.14	22.51	1.65	48.30				26.38	21.92	2.27			

¹ For details see Supplementary Table 1.

² For feeder conduit system see Supplementary Table 2.

³ Includes 9.06 miles duplicated track. (See note 3, page 292.)

⁴ Includes 1 mile double trolley construction.

⁵ Includes 178.89 miles conduit trolley, 130.18 miles third rail, 94.56 miles steam, 3.96 miles cable, 6.06 miles compressed air, and .97 mile storage battery.

⁶ Leased from steam railroad and bridge company.

GENERAL TABLES.

291

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAIL-ROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.							FEEDER WIRE, MILES.		
Within city limits.	Outside city limits.	Equip- ment with cast-welded joints.	Weight of rails per yard.		Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground. (2)	Number.
			Maxi- mum.	Mini- mum.														
9.06			90	60	Girder, T, groove.	2	400	2	1		8.70		44	.55	8.15	6.25		20
2.28			95	56	Girder, T				1	2.13			40		2.13			21
13.21	1.66		70	60	Girder, T					10.07	.90		45		10.97	20.51		22
14.60	29.00		90	50	Girder, groove, T.	5	510	4	1	18.17	12.00	1.00	50	4.00	27.17	38.96		23
4.75	24.75		80	56	Girder, T	23	1,782	4	4	4.00	24.56		40		28.56	27.50		24
	10.02		65	65	T					9.59			40		9.59	5.00		25
	1.40		56	56	T													26
1.75	.35																	
1.75	.35		21	21	T													1
2,129.37	689.60	222.82				410	43,795	228	77	1,053.80	453.04	32.41		485.28	1,047.20	2,740.49	1,155.44	
4.40	38.04		80	70	T, girder.	20	2,996			2.14	.11		42		2.25	360.00		1
73.08	2.75		104	47	T, girder.			13	3	42.90	.75		42	28.71	14.94	94.39		2
33.95	76.78		65	60	Girder, T	38	2,298	4		16.00	82.63	1.84	52	1.84	98.63	59.79		3
	10.00		65	65	T	15	450			8.40		.50	42		8.90	8.90		4
4.16	1.57		85	70	Girder, T	4	236			4.16	1.22		52		5.38	5.38		5
9.26	2.75		90	45	Girder, T	2	110	2	2	6.87	4.00		56		10.87	8.50		6
1.75	5.36		90	60	Girder, T	1	41		1	1.25	5.46		53		6.71	20.00		7
1.50	13.50		70	60	T, girder.	6	860			1.00	11.00		52		12.00	11.00		8
25.26	11.50		94	40	Girder, T	4	112	11	2	24.21		4.50	45		28.71	24.50		9
159.39	63.32	100.94	94	45	T, girder.	67	6,206	32	9	129.87	9.75	6.00	42	42.35	103.27	187.00	64.00	10
96.44	1.33	12.33	94	45	Girder.	17	5,945	42	3	47.15	4.57		42	40.23	11.49	26.18	14.40	11
	14.71		73	60	T, girder.	3	1,177		3			2.50	45		7.25	9.00		12
8.75	5.00		84	60	T, girder.					.55	13.00		52		13.55	10.00		13
3.00			60	35	Girder, T				1	2.00	.75		45		2.75	1.00		14
2.65	.25		70	70	T					2.75			42		2.75			15
6.35			90	70	Girder.			1		5.62	.50		42		6.12			16
3.00	7.04		56	56	Girder, T	8	470	1	2	9.76			43		9.76	5.50		17
4.27	1.63		90	56	Girder, T	2	104	1		4.63	.47		43		5.30	3.80		18
3.75			60	48	Girder, T			1		3.51			45		3.51	3.00		19
3.25			60	56	T				1	2.25	.75		45		3.00	1.75		20
14.00	13.24		90	50	Girder, T	1	100	3	2	20.71	2.44		43		23.15	8.93		21
1.04			85	52	T, girder.					.69	.33		44		1.02			22
4.00	3.00		56	45	T, girder.			2		3.40	3.40		45		6.80	6.80		23
15.00	4.01		60	45	Girder, T	3	84	1	3	8.61	10.00		52		18.61	18.39		24
1.04			90	40	Girder.													25
8.43	9.32		70	45	Girder, T	2	215	1	2	8.43	8.57		52		17.00	26.76		26
.74	3.76		56	56	T	6	60			.15	4.20		45		4.35	4.00		27
5.00	11.52		60	50	T, girder.	8	359		2	4.00	12.00		42		16.00	17.00		28
5.07			56	40	T, girder.			1		3.85	1.00		42		4.86	9.69		29
1.75	2.58		40	40	T	3	178			1.32	3.00		42		4.32	4.50		30
1.25	1.94		56	56	T	1	30		3	3.04			44		3.04	3.04		31
6.53	1.15		62	45	T	9	620		3	4.83	2.50		45	.75	6.58	4.00		32
16.00	4.78		70	30	Girder, T	11	296	6		13.10	3.00		45		16.10	40.00	10.00	33
9.16			80	65	Girder, T	1	1,000	5		7.98			50	7.48	.50	10.00		34
	8.70		75	56	Girder, T				1	2.80	5.70		43		8.50	8.70		35
1.00	4.16		56	44	T	1	19			.25	4.21		45		4.46	4.00		36
3.90	8.94		10	58	T, girder.	5	250	1		10.74	1.00		66		11.74	16.00		37
3.00	6.00		80	80	Girder.	1	10	3	1	3.50	5.00		59	1.50	7.00	2.00		38
6.32	10.17		106	60	T, girder, groove.	15	2,415		3	5.32	7.97	1.00	44	6.32	7.97	26.50		39
3.00	6.27		70	65	Girder, T	10	969			1.00	8.02		52	1.00	8.02	8.00		40
198.74		40.00	113	47	Girder, full groove, flat.	1	1,800			3.00			40		3.00		901.85	41
8.07			110	110	Girder, flat.													42
1.05			108	47	Girder, flat.													43
.97			113	47	Girder, flat.			1										44
6.73			113	47	Girder, flat.			3										45
27.24		10.00	113	47	Girder, flat.													46
25.66		14.28	113	47	Girder, flat.													47
14.97			113	47	Girder, flat.													48
6.25		6.25	113	113	Girder.												5.00	49
7.00			90	90	Girder.				1	3.50			56	3.50		3.50		50
16.00	12.77		109	65	Girder, trilby, T.			1		26.06			53	6.00	20.06	30.00		51
71.10			90	70	Girder.			4		31.86		7.50	59	39.36		100.00		52
14.00	4.69		90	36	Girder, T			2		18.00			50		18.00	18.00		53
25.00	6.05		90	72	Girder.					12.13	13.00		45	17.00	8.13	70.00		54
117.14			90	63	T											28.46	107.48	55
1.50			30	30	Full groove.													56
2.00			57	30	Full groove.													57
524.34			99	60	Girder, full groove, T.	8	1,139	31	2	198.00	2.00		44	193.04	6.96	737.73	45.15	58
48.30			90	60	Girder, T			2		23.14	1.00		45	17.37		89.84		59

¹ Includes third main track.² Includes 40 miles operated by third rail system.³ Includes 1 mile double overhead trolley.⁴ Includes 17.42 miles operated by steam and 3.78 miles by cable.⁵ 6.77 miles of construction supported by elevated structure.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Overhead trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.
NEW YORK—Continued.															
60	Van Brunt Street and Erie Basin	2.50	1.25	1.25		2.50				2.50		.50			
61	New York and Queens County	74.47	40.24	28.96	5.27	74.47				74.47			1.84	9.02	
62	New York and North Shore	24.00	15.60	7.60	.80	24.00				24.00		.80		4.00	
63	Staten Island Midland	27.54	16.04	11.50		27.54				27.54		.10		.73	
64	Staten Island Electric	31.02	18.85	12.13	.04	31.02				31.02				.13	.20
65	Niagara Gorge Railroad	14.40	6.70	6.70	1.00	14.40				14.40		1.00		12.65	
66	Northport Traction	2.74	2.69		.05	2.74				2.74			2.74		
67	Ogdensburg Street Railway	10.00	9.50		.50	10.00				10.00					
68	Olean, Rock City and Bradford	16.55	15.85		.70	16.55				16.55		2.31		16.55	
69	Olean Street Railway	13.25	12.50		.75	13.25				13.25					
70	Oneida Railway	1.50	1.50			1.50			1.50						
71	Oneonta, Cooperstown and Richfield Springs	30.00	27.00		3.00	30.00				30.00			20.43	17.78	
72	Westchester Traction	2.66	2.57		.09	2.66				2.66					
73	Oswego Traction	11.15	10.50		.65	11.15				11.15				.11	.19
74	Peekskill Lighting and Railroad	10.36	10.01		.35	10.36				10.36			4.51	.81	
75	Penn Yan, Keuka Park and Branchport	9.25	8.50		.75	9.25				9.25				1.50	
76	Plattsburg Traction	6.50	6.50			6.50				6.50				3.00	
77	New York and Stamford	16.38	13.97	2.19	.22	16.38				16.38		.15	2.19	.26	
78	Port Jervis Electric, Gas and Railroad	5.10	4.30		.80	5.10				5.10					
79	Poughkeepsie and Wappingers Falls	17.33	15.60	1.14	.59	17.33				17.33					
80	Rochester Railway	*104.92	58.29	44.80	1.83	104.92				86.93	17.99		1.00		
81	Rochester and Suburban	16.30	10.54	5.50	.26	16.30				16.30		3.89	1.00	2.68	
82	Rochester andodus Bay	43.74	39.30	.89	3.55	43.74				38.14	5.60	3.80		7.39	4.39
83	Rochester, Charlotte and Manitou	7.75	7.50		.25	7.75				7.75				7.50	
84	Rome City	6.06	5.50	.50	.06	6.06	C'p air.	6.06		6.06					
85	Schenectady Railway	36.12	21.97	13.28	.87	36.12				36.12		6.66	26.00		
86	Sea Cliff Incline Cable	.18	.09	.09		.18	Cable	.18		.18					.18
87	Southfield Beach Railroad	4.00	1.88	1.87	.25	4.00				4.00				4.00	
88	Syracuse Rapid Transit	68.16	43.40	21.06	3.70	68.16				59.61	8.55		3.78		
89	Syracuse and Suburban	14.31	11.94	1.98	.39	14.31				14.31				.80	
90	Syracuse, Lakeside and Baldwinsville	23.03	14.24	8.00	.79	23.03				23.03				12.00	
91	Utica and Mohawk Valley	76.20	57.03	16.36	2.81	74.21			1.99	62.58	*13.62		20.58	31.00	
92	Black River Traction	10.47	10.00		.47	10.47				10.47				3.50	
93	Elmira and Seneca Lake	16.41	16.13		.28	16.41				16.41				12.63	
94	Buffalo, Gardenville and Ebenezer	4.67	4.50		.17	4.67				4.67					1.21
95	Hamburg Railway	10.33	9.83		.50	10.33				10.33			6.00	8.50	
96	Buffalo and Williamsville	4.54	4.50		.04	4.54				4.54					
NORTH CAROLINA.															
Total for state		46.32	39.44	3.21	3.67	46.32				46.07	.25	12.44	1.87	4.74	5.99
1	Asheville Electric	5.87	5.30		.57	5.87				5.87				1.50	
2	Asheville Street Railroad	7.64	7.30		.34	7.64				7.64		.44			2.74
3	Asheville and Craggy Mountain	3.24	2.64		.60	3.24				3.24		12.00	.40	3.24	
4	Charlotte Railway, Light and Power	11.29	7.97	3.21	.11	11.29				11.29			1.47		
5	Raleigh Electric	4.50	4.25		.25	4.50				4.25	.25				1.25
6	Consolidated Railways, Light and Power	4.65	4.34		.31	4.65				4.65					
7	Fries Manufacturing and Power	9.13	7.64		1.49	9.13				9.13					2.00
OHIO.															
Total for state		2,353.43	1,858.85	423.66	70.92	*2,351.32		.61	1.50	2,101.21	252.22	116.33	324.70	632.12	4.35
1	Ashtabula Rapid Transit	5.75	5.75			5.75				5.75			.76		
2	Pennsylvania and Ohio	27.75	27.00		.75	27.75				27.75			10.00		
3	Ohio Central Traction	17.02	17.00		.02	17.02				17.02				4.00	
4	Consolidated	2.00	2.00			2.00				2.00			2.00		
5	Stark Electric	26.97	26.14	.25	.58	26.97				26.97			4.00	19.48	
6	Canton-Akron	50.17	46.01	3.03	1.13	50.17				50.17			26.31	10.73	
7	Chillicothe Electric Railroad, Light and Power	5.11	5.00		.11	5.11				5.11					
8	Cincinnati Traction	212.96	117.88	95.08		211.46			1.50		212.96		12.00		
9	Price Hill Incline Plane	.61	.15	.46			Cable	.61		.61				.61	
10	Mill Creek Valley	32.50	21.00	11.25	.25	32.50				32.50		4.00			
11	Cincinnati, Dayton and Toledo	78.35	69.67	5.90	2.78	78.35				78.35		.50		8.00	2.00
12	Cincinnati, Lawrenceburg and Aurora	39.25	32.75	6.00	.50	39.25				39.25				4.00	
13	Cleveland Electric Railway	142.46	69.31	64.86	8.29	142.46				137.34	5.12	.86		.76	.48
14	Cleveland City Railway	*94.58	47.87	43.44	3.27	94.58				94.58					
15	Cleveland, Elyria and Western	68.00	62.00	4.00	2.00	68.00				68.00		8.50	6.00	20.00	
16	Eastern Ohio Traction	90.00	85.00		5.00	90.00				90.00		11.00		63.00	
17	Cleveland, Painesville and Eastern	43.26	36.87	4.99	1.40	43.26				43.26				5.00	
18	Northern Ohio Traction	96.85	75.94	19.31	1.60	96.85				96.85		13.40	12.29	12.30	
19	Columbus Railway	106.43	61.53	41.57	3.33	106.43				106.43			8.45		
20	Columbus, London and Springfield	72.60	63.60	5.00	4.00	72.60				58.60	14.00		50.00	38.00	
21	Columbus, Buckeye Lake and Newark	43.50	39.50		4.00	43.50				43.50		1.56	30.00	3.00	
22	City Railway	24.28	12.14	12.14		24.28				24.28		2.27			

* For details see Supplementary Table 1.

* For feeder conduit system see Supplementary Table 2.

* Includes 9.06 miles leased from an operating company.

* Leased from steam railroad.

GENERAL TABLES.

293

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.							FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard.		Style of rail.	No.	Length, feet.	Protected.	Unprotected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Overhead.	Underground. (?)	
			Maximum.	Minimum.														
2.50			94	94	Groove, girder, T.					1.25			75	1.25				60
74.47			93	77	Full groove.	1	60	4		28.59	1.65		42	40.24		105.56		61
19.10	4.90		70	60	Girder.	5	166	3		11.60	4.00		45		15.60	40.00		62
27.54		6.00	70	65	T. Girder.			2		10.80	5.24		54		16.04	17.00		63
31.92		31.02	90	85	Girder.	1	600	6		10.70	8.15		50		18.85	41.00		64
	14.40		65	65	T.	4	335		1	6.70			45	1.10	6.60	6.70		65
.89	1.85		56	56	T.					1.70	.99		44		2.69			66
10.00			52	48	T.			1		8.50	1.00		52		9.50	7.00		67
	16.55		55	40	T.	5	900			.70	15.15		48		15.85	32.00		68
4.06	9.19		60	50	T.	2	110	3	3	2.00	10.50		53		12.50	8.00		69
1.50			47	45	T.			1										70
3.50	26.50		90	60	Girder, T.	8	144			26.00	1.00		52		27.00	30.00		71
2.62	.04		48	48	T.					1.29	1.28		50		2.57	.75		72
6.50	4.65		109	35	Girder, T, groove.	5	1,100	4	2	5.50	5.00		35		10.50	6.50		73
4.09	6.27		56	56	T.			1		2.41	7.60		42		10.01	8.50		74
1.00	8.25		70	60	T.	3	56			.50	8.00		40		8.50	4.00		75
3.50	3.00		50	50	T.			2	2	3.50	3.00		52		6.50	.50		76
12.15	4.23		101	65	Girder, T.	1	25	2		13.25	.72		52		13.97	13.97		77
5.10			60	60	Girder, T.			1	2	2.30	2.00		40		4.30	4.30		78
10.00	7.33		90	60	Girder, T.			2	2	6.60	9.00		50		15.60	22.00		79
86.93	17.99	2.00	107	40	Girder, T, full groove.	4	207	2	1	27.31	27.10	3.88	50	5.00	53.29	39.06	7.56	80
2.41	13.89		107	40	Girder, T.					1.00	5.04		53		6.04	5.25		81
	43.74		60	60	T.	17	834				34.86	4.44	50		39.30	16.00		82
.25	7.50		40	40	T.	6	2,400		1		7.25	.25	58		7.50	7.00		83
6.06			65	65	T.													84
9.25	26.87		90	52	Girder, T.			2	1	20.65	1.12		53		21.97	6.90		85
.18			25	25	T.													86
	4.00		70	70	T.	1	157			1.88			50		1.88			87
68.16			117	60	Girder, T, full groove.	15	862	11	3	29.40	14.00		45	27.00	16.40	44.82		88
1.98	12.33		90	60	Girder, T, half groove.	6	786			2.00	9.94		52	2.00	9.94	35.00		89
2.24	20.79		104	56	Girder, T.	6	1,819		1	11.00	3.24		52	2.24	12.00	21.00		90
45.20	31.00		85	65	Girder, T.	24	1,190	7		49.29	5.75		66		55.04	32.05		91
9.00	1.47		85	56	Girder, T.	6	780	1	3	4.22	5.78		52	1.00	9.00	14.00		92
3.00	13.41		56	56	T.	10	516	2		2.75	13.38		45		16.13	26.00		93
4.67			60	60	T.	1	160		3		4.50		45		4.50			94
3.00	7.33		85	60	T.	6	139		5	9.83			44		9.83	7.10		95
1.00	3.54		60	56	Girder, T.					1.00	3.50		45		4.50	4.00		96
27.28	19.04					9	433	2	3	31.52	7.92				39.44	28.74		
2.50	3.37		70	40	Girder, T.	1	18			2.50	2.80		50		5.30	4.00		1
5.00	2.64		83	40	Girder, T.	3	75			6.30	1.00		50		7.30	.50		2
	3.24		40	40	T.				2	2.64			38		2.64			3
7.13	4.16		65	40	T, girder.	1	60	1	1	7.38	.59		43		7.97	10.15		4
3.00	1.50		85	30	Full groove, T.					3.25	1.00		50		4.25	4.25		5
4.65			56	56	T.					4.06	.28		42		4.34	4.34		6
5.00	4.13		70	64	Girder, T.	4	290	1		5.39	2.25		45		7.64	5.50		7
1,074.88	1,278.56	129.85				394	42,650	201	191	908.56	936.35	12.29		302.41	1,554.79	2,678.60	6.00	
5.75			65	52	Girder.			2	2	5.75			50		5.75	.25		1
3.50	24.25		80	65	T, girder.	1	90	4	2	4.00	23.00		59		27.00	21.00		2
4.50	12.52		60	60	T.	9	33	2		12.00	5.00		60		17.00	12.00		3
2.00			70	60	T.				1	2.00			50		2.00			4
6.91	20.36		90	65	T, girder.	4	392		1	6.66	19.48		53		26.14	26.14		5
15.64	34.53	14.66	70	56	T, girder.	2	550		15	25.14	20.87		53		46.01	50.00		6
5.11			56	50	T.			1		5.00			52		5.00	4.50		7
179.60	33.36		109	52	Girder.			9	15	115.41	.97		59	113.38	3.00	365.50		8
.61			85	65	T.													9
10.00	22.50		72	50	T, girder.	1	80		5	14.50	6.50		52		21.00	22.00		10
14.50	63.85		83	45	T, girder, groove.	28	2,352	6	10	15.82	53.86		45	4.25	65.42	124.00		11
9.00	30.25		70	70	T, girder.	5	1,220		3	7.00	25.75		52		32.75	55.00		12
142.46		37.01	109	52	Girder, T, groove, flat.	5	915	25	21	69.31			55	53.66	15.65	53.59		13
94.58			95	70	Girder, groove, T.			11		47.87			60	47.87		100.00		14
13.50	54.50		73	45	T, girder.	4	380	10		13.50	48.50		62	1.00	61.00	115.00		15
2.50	87.50		80	60	T.	7	330				80.00	5.00	58		85.00	85.00		16
18.25	25.01		95	60	T, girder.	3	2,700	2		32.37	3.00	1.50	58	1.00	35.87	83.00		17
27.87	68.98		80	50	T, girder, groove.	15	2,330	10		38.44	35.00	2.50	50		75.94	50.00		18
77.69	28.74	50.28	107	45	T, girder.			7	8	61.53			41	29.23	32.30	82.34		19
3.10	69.50		70	70	T, trilby.	7	1,360		5	15.00	48.60		53	4.00	59.60	50.00		20
4.00	39.50		109	70	T.	20	2,170	2		10.50	29.00		52	4.00	35.50	41.00		21
20.48	3.80	2.50	90	60	Girder, T.			5	4	10.35		1.79	48	8.14	4.00	7.50		22

¹ Leased from city.² Includes 215.46 miles double trolley construction.³ Double trolley construction.⁴ Second, third, and fourth main track.⁵ Exclusive of 5.12 miles leased to Cleveland Electric Railway Company.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

Number.		STATE AND NAME OF COMPANY.	TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.													
			Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for operation during year.	On private right of way—	
				First.	Second.			Kind.	Miles.						Owened by company.	Not owned by company.
OHIO—Continued.																
23	Peoples Railway.....	20.70	10.26	9.58	.86	20.70				20.70			2.00	.60		.70
24	Oakwood Street.....	7.90	3.95	3.95		7.90				7.90						
25	Dayton and Western.....	22.25	22.00		.25	22.25						6.00				
26	Dayton and Northern.....	40.05	39.00		1.05	40.05						4.86			33.75	
27	Dayton, Springfield and Urbana.....	54.07	45.53	8.00	.54	54.07				48.63	5.44	1.53			41.91	
28	Dayton and Troy.....	42.70	33.00	9.00	.70	42.70				28.00	14.70	4.00			18.25	
29	Dayton and Xenia.....	50.12	49.06		1.06	50.12				50.12		2.89			8.00	
30	Peoples Gas and Electric.....	4.53	4.50		.03	4.53				4.53						
31	Delaware Electric Railway.....	7.50	7.00		.50	7.50				7.50						
32	United Electric.....	2.03	2.00		.03	2.03				2.03				.17		.17
33	East Liverpool Railway.....	14.71	14.43		.28	14.71				14.71				2.50	.28	
34	Lancaster Traction.....	3.81	3.52		.29	3.81				3.81						
35	Lima Railway and Light.....	18.55	10.55	7.50	.50	18.55				18.55		2.00				
36	Western Ohio Railway.....	77.97	75.97		2.00	77.97				77.97		2.60	20.00		64.04	
37	Lorain Street Railway.....	11.67	9.60		2.07	11.67				11.67					7.10	
38	Mansfield Railway, Light and Power.....	21.00	20.50		.50	21.00				21.00					12.00	
39	Marion Street Railway.....	4.28	4.02		.26	4.28				4.28						
40	Mt. Vernon Electric Railway.....	5.10	5.00		.10	5.10				5.10						
41	Newark and Granville.....	13.89	13.87		.02	13.89				13.89					1.00	
42	Tuscarawas Traction.....	13.43	12.73		.70	13.43				13.43					.01	
43	Ohio River Railway and Power.....	13.02	12.52		.50	13.02				13.02					3.60	
44	Portsmouth Street Railroad.....	5.50	5.30		.20	5.50				5.50					.60	
45	Salem Electric Railway.....	2.65	2.58		.07	2.65				2.65						
46	Springfield Railway.....	28.13	18.77	8.36	1.00	28.13				28.13						
47	Springfield and Xenia.....	18.08	18.00		.08	18.08				18.08		.60	18.08		12.00	
48	Steubenville and Pleasant Heights.....	3.08	2.91		.17	3.08				3.08			3.08		.80	
49	Steubenville Traction and Light.....	12.78	12.03		.75	12.78				12.78			9.50		1.74	
50	Electric Railway and Power.....	7.33	7.33			7.33				7.33					.33	
51	Tiffin, Fostoria and Eastern.....	17.00	16.50		.50	17.00				17.00					.50	
52	Toledo Railways and Light.....	97.78	65.75	31.03	1.00	97.78				97.78			.24		1.41	1.00
53	Toledo, Bowling Green and Southern.....	40.37	40.00		.37	40.37				40.37		12.00	13.00		30.00	
54	Toledo, Fostoria and Findlay.....	16.28	16.00		.28	16.28				16.28		1.00			14.00	
55	Toledo and Western.....	66.59	43.94	19.64	3.01	66.59				66.59		4.00	47.06		61.90	
56	Lake Shore.....	160.43	155.00		5.43	160.43				160.43		22.98	30.00		75.00	
57	Toledo and Maumee Valley.....	20.22	19.52		.70	20.22				20.22		7.78			17.22	
58	Wellston and Jackson Belt.....	10.50	10.50			10.50				10.50					8.06	
59	Worthington, Clintonville and Columbus.....	5.12	5.00		.12	5.12				5.12						
60	Youngstown Park and Falls.....	6.13	3.63	2.40	.10	6.13				6.13					.10	
61	Youngstown-Sharon Railway and Light.....	42.25	39.00		3.25	42.25				42.25			17.17		21.37	
62	Mahoning Valley.....	53.53	44.47	6.92	2.14	53.53				53.53					8.38	
63	Zanesville Electric Railway.....	10.00	9.50		.50	10.00				10.00			1.50			
OREGON.																
Total for state.....		136.67	94.40	36.90	5.37	132.17		4.50		136.67		3.81	6.65	20.16		
1	Astoria Electric.....	4.10	4.00		.10	4.10				4.10						
2	Portland Railway.....	28.03	16.29	10.90	.84	26.03	Cable..	2.00		28.03		2.16	.40		2.75	
3	City and Suburban.....	65.50	39.00	24.00	2.50	65.50				65.50			2.20		5.65	
4	Portland City and Oregon.....	24.59	21.36	2.00	1.23	24.59				24.59		1.40	4.05		11.76	
5	Salem Light, Power and Traction.....	11.95	11.75		.20	11.95				11.95						
6	Union Street and Suburban.....	2.50	2.00		.50		Steam..	2.50		2.50		.25				
PENNSYLVANIA.																
Total for state.....		2,481.91	2,001.56	376.96	103.39	2,469.70		11.40	.81	1,256.67	1,226.24	36.49	215.82	342.26	96.37	
1	Lehigh Valley Traction.....	148.81	133.23	9.77	5.81	148.81				54.49	94.32				6.00	
2	Philadelphia and Lehigh Valley.....	50.05	47.95		2.10	50.05				39.21	10.84		26.60		12.50	
3	Allentown and Kutztown Traction.....	22.00	20.00	.50	1.50	22.00				22.00			.80		17.50	
4	Altoona and Logan Valley.....	19.00	15.25	1.75	2.00	19.00				19.00		8.50	2.00		10.37	
5	Bangor and East Bangor.....	2.75	2.75			2.75				2.75			2.75		1.25	
6	Beaver Valley Traction.....	22.50	15.18	5.98	1.34	22.50				22.50			9.20			
7	Riverview Electric Street Railway.....	3.63	3.52		.11	3.63				3.63						
8	Patterson Heights Street Railway.....	.45	.11	7.34		.11	Cable..	.34		.45					.45	
9	Columbia and Montour.....	16.25	16.00		.25	16.25				16.25			3.00			2.00
10	Bradford Electric Street Railway.....	11.47	10.93		.54	11.47				11.47					1.00	
11	Butler Passenger Railway.....	7.25	7.00		.25	7.25				7.25			2.00		.60	1.50
12	Carlisle and Mt. Holly.....	6.30	5.80		.50	6.30				6.30		.50	.13		5.50	
13	Cumberland Valley Traction.....	20.00	18.00		2.00	20.00				20.00					10.00	
14	Chester Traction.....	32.07	30.20		1.87	32.07					32.07				3.58	8.98
15	Media, Middletown, Aston and Chester.....	18.95	17.93		1.02	18.95				18.95			5.86			
16	Philadelphia and Chester Railway.....	8.72	8.23		.49	8.72				8.72					.20	5.72
17	Connellsville Suburban.....	2.50	2.40		.10	2.50				2.50					1.40	
18	Newtown Electric Street Railway.....	27.89	27.59		.30	27.89				18.70	9.19				17.45	8.44
19	Doylestown and Easton.....	6.00	5.80		.20	6.00				6.00			6.00			5.00
20	Doylestown and Willow Grove.....	13.38	13.18		.20	13.38				13.38						
21	Dubois Traction.....	1.34	1.29		.05	1.34				1.34					.19	
22	Easton and Nazareth.....	10.00	9.40		.60	10.00				10.00					7.45	
23	Erie Electric Motor.....	28.00	17.00	9.75	1.25	28.00				28.00					1.75	
24	Erie Traction.....	28.00	27.50		.50	28.00				28.00					6.00	.13
25	Erie Rapid Transit.....	13.00	12.50		.50	13.00				13.00		3.00	13.00		.50	
26	Franklin Electric Street Railway.....	3.74	3.19	.31	.24	3.74				3.74						3.74
27	Gettysburg Transit.....	9.50	8.50		1.00	9.50				9.50					3.00	
28	Hanover and McSherrystown.....	3.73	3.63		.10	3.73				3.73						1.50

1 For details see Supplementary Table 1.

2 For feeder conduit system see Supplementary Table 2.

3 Includes 4 miles double trolley construction.

4 Includes 2 miles of cable and 2.50 miles of steam.

GENERAL TABLES.

295

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi. Mini. mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground. (?)	
20.70			106	60	Flat, T, girder				7.46	1.30	1.50	53	8.26	2.00	22.69		23
7.00			90	66	Girder			1	3.95			52	3.95		3.07		24
	22.25		70	70	T, groove	4	400	2	7.75	21.25		52		22.00	22.00		25
5.25	34.40		70	70	T	26	422	6	5.25	33.75		53	.50	38.50	38.50		26
9.18	44.89		70	70	T	16	436	6	9.18	36.35		52	2.83	42.70	38.55		27
10.50	32.20		72	45	Girder, T	17	2,740	1	16.75	16.25		40		33.00	20.00		28
8.74	41.38		110	60	T, groove	6	1,500	6	1.84	47.22		53	2.44	46.62	50.00		29
4.53			48	48	T	1	50		4.50			50		4.50	4.50		30
7.50			50	50	Girder			2	7.00			52		7.00	2.00		31
2.03			60	45	Girder, T			1	2.00			60		2.00			32
12.63	2.08		82	56	Girder, T	6	1,180	2	12.93	1.50		50		14.43	6.40		33
3.81			80	60	T				3.52			60		3.52	1.50		34
18.55			85	60	Girder			2	10.65			50	.25	10.30	3.00		35
11.93	66.04		70	60	T, girder	31	6,043	10	11.93	64.04		60	.50	75.47	75.47		36
2.50	9.17		80	70	T, girder	2	18	3	9.60			48		9.60	8.00		37
8.50	12.50		80	48	T, girder	7	1,140	3	6.50	14.00		54		20.50	5.50		38
4.28			60	60	T			4	4.02			50		4.02			39
3.50	1.60		60	50	T				4.75	.25		52	.25	4.75	3.50		40
6.00	7.89		70	35	T, girder			1	8.87	5.00		52		13.87	11.00		41
5.54	7.89		80	45	Girder, T	3	225	1	5.53	7.20		50		12.73	8.00		42
4.80	8.22		60	60	T	3	400	2	6.30	7.22		65		12.52	6.60		43
3.00	2.50		70	48	T			1	5.30			42		5.30			44
2.65			75	45	Girder				2.58			30		2.58	.11		45
28.13			90	35	Girder, T			2	18.77			53		18.77	28.12		46
2.75	15.33		70	70	T, girder	6	388	2	2.15	15.85		53		18.00	15.00		47
3.08			60	60	T			1	2.91			44		2.91	.82		48
5.50	7.28		60	60	T	10	445	1	7.00	5.03		55		12.03	8.21		49
7.33			80	50	Girder, T			3	3.00	4.33		50		7.33	5.00		50
4.50	12.50		72	60	Girder, T	6	234	4	16.50			58		16.50	12.00		51
94.87	2.91	25.00	90	45	Girder, T			14	60.75	5.00		40	5.00	60.75	264.00	6.00	52
12.00	28.37		70	60	T	5	200	4	7.00	33.00		52		40.00	50.00		53
3.00	13.28		60	60	T	9	155	3	2.00	14.00		52		16.00	21.00		54
4.69	61.90		60	60	T	24	1,063	2	5.76	38.18		56		43.94	211.50		55
26.90	133.53		95	45	T, girder	55	6,081	7	59.00	96.00		60		155.00	175.00		56
3.00	17.22		56	45	T	3	330	5		19.52		53		19.52	23.72		57
2.00	8.50		60	60	T, girder			3	10.50			53		10.50	9.00		58
	5.12		45	45	T					5.00		50		5.00	5.00		59
1.50	4.63		90	70	Girder, T				3.34	.29		60	1.00	2.63	3.00		60
13.24	29.01		90	70	Girder, T	36	2,763	10	10.10	28.90		52		39.00	85.02		61
27.72	25.81		90	60	Girder, T	7	1,535	1	28.07	16.40		50	10.50	33.97	40.00		62
10.00			70	45	Girder, T				9.50			52	.40	9.10	10.00		63
105.58	31.09	7.90				9	21,564	3	64.53	27.87				92.40	100.87		
4.10			52	30	T, girder	1	5,500		4.00			52		4.00			1
28.03			91	40	T, girder	2	9,200		16.29			44		16.29	16.41		2
54.00	11.50	7.50	85	30	T, girder			3	32.50	6.50		51		39.00	54.00		3
11.00	13.59		60	30	T	3	6,284	2	2.00	19.36		52		21.36	21.36		4
7.95	4.00		40	22	T	3	600	5	9.74	2.01		52		11.75	9.10		5
.50	2.00		90	60	T			4									6
1,368.37	1,113.54	27.47				352	34,564	193	295	1,532.83	450.69	9.27		540.20	1,452.19	2,669.72	632.29
15.00	133.81		90	50	Girder, T	8	1,500	5	133.23			42		133.23	100.00		1
8.25	41.80		95	60	Girder, T	18	1,045	1	42.95	5.00		50	.50	47.45	90.00		2
2.00	20.00		95	45	Girder, T	20	715	1	3.50	16.50		44		20.00	15.75		3
15.63	3.37		106	56	Girder, T	12	575	1	6.22	8.23	.80	53		15.25	27.50		4
1.50	1.25		87	87	T			1	1.50	1.25		45		2.75	2.75		5
21.50	1.00		90	40	Girder, T			1	15.18			45		15.18	27.00		6
3.63			73	60	Girder, T			1	3.52			44		3.52	2.50		7
.45			30	30	T				.11			82		.11			8
3.00	13.25		60	60	T, girder	3	420	1	13.00	3.00		44		16.00	9.00		9
8.20	6.27		72	48	Girder, T	3	100	3	4.50	6.43		48		10.93	11.47		10
5.00	2.25		66	60	Girder, T			1	5.00	2.00		52		7.00	4.00		11
1.30	5.00		70	70	Girder, T	5	140		.80	5.00		52		5.80	6.00		12
7.00	13.00		70	45	Girder, T	4	70		9.00	9.00		52		18.00	14.00		13
23.55	8.52		90	60	Girder, T, box	2	90	4	16.23	13.97		44		30.20	89.43		14
14.59	4.36		70	70	Girder, T	7	585	1	17.93			42	2.00	15.93	16.00		15
2.80	5.92		40	40	Girder, T	2	100	6	2.82	5.41		44		8.23	8.83		16
1.10	1.40		56	56	T	1	50		2.40			42		2.40	2.40		17
4.75	23.14		70	60	Girder, T	3	300		3.00	24.59		41		27.59	27.00		18
1.00	5.00		70	70	Girder, T	1	60		1.00	4.80		48		5.80	2.00		19
	13.38		56	56	T	10	1,000		1.18	12.00		47		13.18	13.00		20
1.34			45	45	Girder				1.29			38		1.29	.75		21
1.73	8.27		90	65	Girder, T	9	719	2	1.50	7.90		48	2.40	7.00	18.00		22
9.00	19.00		90	75	Girder, T	2	200	1	16.00		1.00	44	1.00	16.00	25.00		23
2.50	25.50		90	56	Girder, T	8	170		2.50	25.00		50		27.50	50.00		24
.08	12.92		63	60	Girder, T	4	215		1.00	11.50		42		12.50	17.50		25
3.74			60	58	T			1	2.99	.20		45		3.19	1.60		26
2.50	7.00		60	60	T	3	90		2.50	6.00		52		8.50	8.50		27
2.23	1.50		56	45	Girder, T			3	3.00	.63		50		3.63			28

¹ Includes 1 mile duplicated track. (See note 3, page 296.)² Includes 5.90 miles cable and 5.50 miles steam.³ Second, third, and fourth main track.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.															
Number.	STATE AND NAME OF COMPANY.	Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owened by company.	Not owned by company.
PENNSYLVANIA—Continued.															
29	Lehigh Traction	20.09	18.61		1.48	20.09				20.09				14.66	
30	Harrisburg Traction	49.00	48.00	4.00	2.00	49.00				32.00	17.00		1.00	.50	2.50
31	Harrisburg and Mechanicsburg	15.24	15.00		.24	15.24				7.94	7.30	.11	7.30	7.00	.88
32	Cambria Incline Plane	.34	.17	.17			Cable.	.34		.34					.34
33	Johnstown Passenger Railway	31.30	28.80	5.60	1.90	31.30				31.30				10.00	
34	Kittanning and Ford City	5.25	5.00		.25	5.25				5.25					1.00
35	Conestoga Traction	88.81	82.00		1.81	83.81				34.53	49.28			20.00	.50
36	Lebanon Valley	23.00	22.00		1.00	23.00				23.00				.25	
37	Lewistown and Reedsville	6.25	6.00		.25	6.25				6.25				5.50	
38	Susquehanna Traction	5.35	5.20		.15	5.35				5.35				2.60	
39	Lykens and Williams Valley	10.74	10.30		.44	10.74				10.74			.32	.20	
40	Highland Grove	1.02	1.00		.02	1.02				1.02		2.00			
41	Schuylkill Traction	28.00	27.00		1.00	28.00				28.00					
42	Mauch Chunk, Lehigh and Slatington	13.19	12.39		.80	13.19				13.19			8.15	9.19	
43	Meadville Traction	11.00	11.00			11.00				11.00					
44	Lewisburg, Milton and Watson-town	9.88	9.75		.13	9.88				9.88				.25	
45	Montoursville Passenger	5.00	4.96		.04	5.00				5.00					.50
46	New Castle Traction	19.20	10.80	8.20	.20	19.20				19.20				3.00	
47	New Castle and Lowell	12.49	10.12		2.37	12.49				12.49			12.49	12.49	
48	Schuylkill Valley Traction	51.31	47.00	2.00	2.31	51.31					51.31		.80	1.50	
49	Lansdale and Norristown	10.28	10.10		.18	10.28				10.28		8.00	10.28	5.10	
50	Peoples Street Railway	6.00	5.96		.04	6.00				6.00					
51	Citizens Traction	13.42	12.40	.68	.39	13.42				13.42			5.00	5.50	
52	Oil City Street Railway	8.10	7.17		.93	8.10				4.58	3.52			.10	7.07
53	Union Traction	475.46	337.31	113.93	24.22	475.46					475.46		18.90		
54	Southwestern Street Railway	15.98	9.49	6.21	.28	15.98				15.98				5.20	
55	Philadelphia, Bristol and Trenton	11.81	11.25		.56	11.00			.81	11.81			.89		
56	Philadelphia and West Chester Traction	24.08	23.33		.75	24.08				20.75	3.33				3.00
57	Holmesburg, Tacony and Frankford	18.29	12.89	4.28	1.12	18.29				17.29	1.00				
58	Fairmount Park Transportation	8.80	8.60		.20	8.80				8.80					
59	Delaware County and Philadelphia	15.00	14.50		.50	15.00				10.00	5.00			.06	.06
60	Montgomery and Chester	5.57	5.50		.07	5.57				5.57				2.00	
61	Pittsburg Railways	410.01	233.48	173.81	2.72	407.23	Cable.	2.78		48.51	361.50		24.19	22.70	
62	St. Clair Incline Plane	.80	.40	.40			Cable.	.80		.80				.80	
63	Duquesne Incline Plane	.30	.15	.15			Cable.	.30		.30				.30	
64	Pittsburg and Castle Shannon	.52	.26	.26			Cable.	.52		.52				.52	
65	Monongahela Incline Plane	.48	.12	.36			Cable.	.48		.48				.48	
66	Penn Incline Plane	.34	.17	.17			Cable.	.34		.34				.34	
67	Pittsburg, McKeesport and Greensburg	21.36	20.46		.90	21.36				21.36			8.70	7.87	
68	Pittsburg, McKeesport and Con-nellsville	56.00	49.47	5.11	1.42	56.00				56.00			21.00	15.50	1.75
69	Pottstown Passenger Railway	6.11	6.00		.11	6.11				6.11				12.00	
70	Ringneck Electric	3.80	3.60		.20	3.80				3.80				1.00	1.60
71	Pottsville Union Traction	30.60	24.60	1.60	4.40	30.60				30.60		12.20		1.25	18.00
72	Punxsutawney Street Railway	12.13	12.00		.13	12.13				12.13					
73	United Traction	63.44	55.11	3.80	4.53	63.44					63.44		.64		8.98
74	Waverly, Sayre and Athens	9.11	9.00		.11	9.11				9.11					
75	Never Sink Mountain Railroad	8.70	8.03		.67	8.70				8.70				7.42	
76	Mt. Penn Gravity Railway	8.00	7.80	.10	.20	8.00	Steam.	5.50		8.00				8.00	
77	Scranton Railway	76.68	65.33	8.74	2.61	76.68				38.10	38.58		1.20	1.80	.38
78	Shamokin and Mt. Carmel	19.35	19.00		.35	19.35				16.25	3.10	1.00			7.10
79	Shamokin and Edgewood	3.20	3.10		.10	3.20				3.20					
80	Stroudsburg Passenger	2.75	2.70		.05	2.75				2.75			1.00		
81	Sunbury and Northumberland	3.90	3.40		.50	3.90				3.90					.50
82	Tamaqua and Lansford	14.63	12.71		1.92	14.63				14.63			8.71	10.85	
83	Tarentum Traction Passenger	6.61	6.11		.50	6.61				6.61			2.70		
84	Titusville Electric Traction	12.00	11.00		1.00	12.00				12.00				8.00	
85	Warren Street Railway	20.00	19.25		.75	20.00				20.00					5.00
86	Washington Electric Railway	3.26	3.23		.03	3.26				3.26					
87	West Chester Street Railway	5.86	5.75		.11	5.86				5.86				3.00	
88	Wilkesbarre and Wyoming Valley	66.58	52.31	7.50	6.77	66.58				66.58				6.00	
89	Wilkesbarre, Dallas and Harveys Lake	13.00	11.83		1.17	13.00				13.00		3.50		12.99	
90	Vallamont Traction	3.47	3.43		.04	3.47				3.47		.23			
91	South Side Passenger Railway	1.85	1.81		.04	1.85				1.85		.18			
92	Williamsport Passenger Railway	8.64	6.96	1.54	.14	8.64				8.64				.10	.20
93	East End Passenger Railway	2.45	2.45			2.45				2.45					
94	Red Lion and Windsor	2.00	2.00			2.00				2.00			2.00		
95	Yardley, Morrisville and Trenton	5.99	5.96		.03	5.99				5.99					
96	York and Dover Electric	7.93	7.61		.42	7.93				7.93		1.13	7.93	6.00	
97	York and Dallastown Electric	6.28	5.91		.37	6.28				6.28		1.14	6.28	3.64	
98	York Street Railway	12.25	11.50		.75	12.25				12.25				1.00	
RHODE ISLAND.															
Total for state		328.90	270.00	42.18	16.72	328.90				328.90		7.43	38.07	72.59	.30
1	Sea View Railroad	18.88	18.04		.84	18.88				18.88				17.92	
2	Pawtucket Street Railway	19.71	18.04	.57	1.10	19.71				19.71					
3	Union Railroad	137.05	104.55	24.64	7.86	137.05				137.05		4.03	7.54	.23	
4	Rhode Island Suburban	68.07	55.34	9.20	3.63	68.07				68.07			4.88	11.40	.30
5	Providence and Danielson	25.12	24.15		.97	25.12				25.12		3.40	24.15	11.64	
6	New York, New Haven and Hart-ford	31.50	22.23	7.77	1.50	31.50				31.50				31.25	
7	Pawcatuck Valley Railway	6.23	6.15		.08	6.23				6.23				.15	
8	Woonsocket Street Railway	22.34	21.50		.84	22.34				22.34			1.50		

1 For details see Supplementary Table 1.

2 For feeder conduit system see Supplementary Table 2.

3 Includes 1 mile leased from an operating company.

4 Second, third, and fourth main track.

GENERAL TABLES.

297

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAIL-ROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.					FEEDER WIRE, MILES.			
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi. Mini-mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground. (?)	Number.
2.63	17.46		60	Girder, T	10	241	4	12	2.50	16.11		50		18.61	44.20		29
37.00	12.00		107	Girder, T, groove.	9	170	6	1	34.90	8.00	10	50	12.00	31.00	90.00		30
5.24	10.00		60	Girder, T	2	150			11.50	3.50		56		15.00	14.00		31
.34			40	T	1	100											32
11.80	19.50	.50	97	Girder, T	10	775	4	7	23.80			52		23.80	20.00		33
4.00	1.25		70	Girder, T	4	62			3.00	2.00		50		5.00	2.00		34
13.55	70.26		90	Girder, T	8	2,360	5	7	77.00	5.00		60		82.00	200.00		35
5.00	18.00		90	Girder, T	5	63	1	6	9.00	13.00		40		22.00	29.00		36
2.00	4.25		90	Girder, T	3	210			3.00	3.00		45		6.00	4.50		37
2.60	2.75		56	Girder, T	1	40	1		3.00	2.20		43		5.20	4.20		38
3.50	7.24		76	Girder, T, groove.	1	120			10.30			40		10.30	5.00		39
1.02			80	Girder, T			1			1.00		58	1.00		2.00		40
8.00	20.00		70	T	16	2,368		15	8.00	19.00		60		27.00	68.75		41
4.00	9.19		85	Girder, T					3.87	8.52		43		12.39	10.50		42
6.50	4.50		70	Girder	2	240	2		6.50	4.50		56		11.00	6.00		43
2.00	7.88		70	T	4	90			2.00	7.75		56		9.75	4.00		44
2.00	3.00		56	Girder, T					2.00	2.96		50		4.96	3.00		45
16.20	3.00		80	Girder, T			6	11	10.80			53		10.80	18.00		46
.56	11.93		70	T				2	10.12			52		10.12	16.00		47
10.80	40.51		90	Girder, T	1	35	6	2	18.82	28.18		55	9.00	38.00	83.82		48
3.75	6.53		78	Girder, T	1	100	1		2.00	8.10		52		10.10	16.00		49
1.00	5.00		56	T	3	90		2	4.96	1.00		57		5.96	5.50		50
5.51	7.91		70	Girder, T	3	755	1		7.93	4.47		60		12.40	9.10		51
3.83	4.27		70	Girder, T			3		2.30	4.87		45		7.17			52
465.00	10.46	26.97	135	Girder, T			54	55	308.86	23.08	5.37	50	336.31	1.00	186.18	628.29	53
15.98			90	Girder, T				3	6.39	3.10		41	6.89	2.60	30.00		54
1.25	10.56		90	Girder, T					7.00	3.44		48		10.44	9.00		55
	24.08		70	Girder, T	4	60		1	16.33	7.00		50		23.33	40.00		56
18.29			70	Girder, T			1	3	12.89			53		12.89	14.50		57
8.80			90	T	15	2,922			8.60			58	8.60			4.00	58
3.60	11.40		80	Girder, T	3	440			1.60	12.90		50		14.50	44.00		59
2.00	3.57		80	T	2	350			2.00	3.50		45	1.00	4.50	3.00		60
239.07	170.94		117	Girder, T	6	2,775	17	32	232.09			45	154.50	77.59	434.25		61
.80			60	T													62
.30			45	T													63
.52			60	T													64
.48			75	T													65
.34			60	T													66
6.05	15.31		85	Girder, T	19	799		2	20.36	10		55		20.46	20.46		67
38.75	17.25		90	Girder, T	16	2,770		12	42.47	7.00		42	3.00	46.47	49.47		68
3.50	2.61		66	Girder, T					3.50	2.50		50		6.00	6.00		69
1.50	2.30		80	Girder, T	1	75			1.50	2.10		50		3.60	3.00		70
12.00	18.60		70	Girder, T	3	150		9	11.40	13.20		40		24.60	36.00		71
2.00	10.13		56	Girder, T	3	95	2	4	12.00			50		12.00	8.00		72
34.23	29.21		98	Girder, T	15	867	3	7	50.56	4.55		50		55.11	100.15		73
9.11			60	T	3	400			8.25	7.75		52		9.00	3.00		74
1.28	7.42		56	T	3	288			2.27	5.76		50		8.03	16.06		75
	8.00		45	T					2.50			40		2.50	2.50		76
65.18	11.50		107	Full groove, girder, T.	5	3,080	11	19	57.33	8.00		38	.50	64.83	76.68		77
4.00	15.35		70	Girder, T	3	1,100		2	4.00	15.00		50		19.00	32.00		78
2.20	1.00		56	Girder, T	1	10		3	2.05	1.05		55		3.10	5.50		79
2.75			60	T				1	2.48	.22		42		2.70	.68		80
2.50	1.40		56	Girder, T				3	3.30	.20		44		3.00	2.00		81
3.70	10.93		60	T	4	300	1	3	12.71			58		12.71	41.00		82
6.61			70	T					6.11			48	1.25	4.86	6.11		83
4.00	8.00		67	T	2	330		2	7.00	4.00		40		11.00	7.00		84
6.00	14.00		77	T, girder	3	60		2	14.25	5.00		50		19.25	15.00		85
3.26			60	Girder, T					3.23			40		3.23	3.23		86
1.66	4.20		48	Girder, T	2	530			1.75	4.00		45		5.75	7.50		87
60.00	6.58		90	Girder, T	11	340	30	10	45.31	5.00	2.00	53	.25	52.06	150.00		88
2.00	11.00		60	T	9	217			4.16	7.67		65		11.83	15.00		89
2.31	1.16		65	Girder, T			1	1	3.43			45		3.43	2.30		90
1.85			65	Girder, T			1	1	1.81			45		1.81			91
8.64			90	Girder, T	1	265			6.96			45		6.96	2.00		92
1.08	1.39		45	Girder, T					2.45			45		2.45			93
.50	1.50		60	T, groove					2.00			52		2.00	2.00		94
1.25	4.74		70	T					5.96			50		5.96			95
1.60	6.33		60	Girder, T	1	120		1	7.51			52		7.51	30.00		96
	6.28		60	Girder, T	7	155			5.91			52		5.91	15.00		97
9.25	3.00		70	Girder, T	1	23	2	5	11.50			52		11.50	15.00		98
				Girder, T													
226.37	102.53	14.50			20	4,518	7	11	159.08	110.92			26.74	243.26	237.54		
19.71	18.88		60	56 T	7	1,280		2	17.04	1.00		55		18.04	33.00		1
136.82	.28	14.50	90	60 T, girder	1	460	1	4	9.08	8.96		50	3.34	14.70	6.10		2
56.36	11.71		98	60 T, girder	11	2,766	2	4	81.15	23.40		50	23.40	81.15	60.88		3
	25.12		98	60 T, girder			3	1	20.31	35.03		50		55.34	38.86		4
.25	31.25		60	60 T						24.15		50		24.15	49.86		5
			90	T					22.23			50		22.23	22.00		6
2.23	4.00		90	50 T, girder	1	12			.45	5.70		50		6.15	5.50		7
11.00	11.34		60	50 T			1		8.82	12.68		52		21.50	21.34		8

¹. 40 mile of construction supported by bridge structures.² Technically leased.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

Number.		STATE AND NAME OF COMPANY.	TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.													
			Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—	
				First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.
SOUTH CAROLINA.																
		Total for state.....	76.98	63.33	10.65	3.00	73.80			3.18	76.98		1.00	6.50	15.70	2.43
1		North Augusta Electric and Improvement.	2.38	2.00		.38	2.38				2.38		1.00		2.00	
2		Charleston Railway, Gas and Electric.	34.42	24.67	9.15	.60	34.42				34.42			3.50		1.63
3		Columbia Railway, Light and Power	14.00	12.00	1.50	.50	14.00				14.00				3.70	.80
4		Greenville Traction.....	7.00	6.77		.23	7.00				7.00					
5		Orangeburg City Street Railway.	1.87	1.75		.12				1.87	1.87					
6		Rock Hill Water, Light and Railway.	1.31	1.25		.06				1.31	1.31					
7		Spartanburg Railway, Gas and Electric.	16.00	14.89		1.11	16.00				16.00			3.00	10.00	
SOUTH DAKOTA.																
		Total for state.....	2.00	2.00						2.00	2.00					
1		Rapid City Street Railway ¹	2.00	2.00						2.00	2.00					
TENNESSEE.																
		Total for state.....	254.20	199.87	46.63	7.70	² 248.40		³ 5.80		254.20			13.07	13.13	6.03
1		Bristol Belt Line.....	4.25	4.00		.25	4.25				4.25			.25		
2		Chattanooga Electric Railway.....	38.38	32.25	5.13	1.00	38.38				38.38			4.00	1.00	
3		Rapid Transit of Chattanooga.....	38.50	37.50		1.00	² 32.70	Steam	³ 5.80		38.50			5.00	5.00	6.00
4		Electric Railway of Clarksville.....	5.50	5.30		.20	5.50				5.50					
5		Jackson and Suburban.....	3.19	3.04		.15	3.19				3.19					.08
6		Knoxville Traction.....	26.00	19.60	4.40	2.00	26.00				26.00				.33	
7		Memphis Street Railway.....	71.88	47.11	23.52	1.25	71.88				71.88			2.00	2.23	
8		Nashville Railway.....	66.50	51.07	13.58	1.85	66.50				66.50			1.82	4.57	
TEXAS.																
		Total for state.....	303.27	254.55	39.81	8.91	296.40			6.87	303.27		6.08	54.45	50.24	3.16
1		Austin Electric Railway.....	13.38	10.40	2.94	.04	13.38				13.38					
2		Bonham Electric Railway, Light and Power.	2.63	2.50		.13	2.63				2.63			.50		
3		Dallas Consolidated.....	34.64	26.50	6.86	1.28	34.64				34.64			.50	.20	
4		Rapid Transit.....	11.66	8.45	1.85	1.36	11.66				11.66		1.34		.57	
5		Denison and Sherman.....	16.20	16.00		.20	16.20				16.20				8.20	
6		El Paso Electric Railway.....	13.48	13.09		.39	13.48				13.48			13.48		
7		Northern Texas Traction.....	61.70	57.70	2.40	1.60	61.70				61.70			34.70	38.94	3.16
8		Galveston Street Railway.....	35.86	25.35	10.00	.51	35.86				35.86			.30		
9		Houston Electric.....	37.20	31.06	6.13	.01	37.20				37.20				.08	
10		Laredo Electric and Railway.....	2.85	2.70		.15	2.85				2.85					
11		Longview and Junction.....	.63	.63						.63	.63					
12		Paris Transit.....	5.00	4.86		.14	5.00				5.00			4.86	.44	
13		San Antonio Traction.....	45.51	34.10	8.72	2.69	45.51				45.51				1.08	
14		Seguin Street Railway.....	1.50	1.50						1.50						
15		Citizens Railway.....	16.29	15.09	.91	.29	16.29				16.29				.73	
16		Waxahachie Street Railway.....	2.71	2.65		.06				2.71			2.03	.11		
17		Lake Park Street Railroad.....	2.03	1.97		.06				2.03	2.03		2.71			
UTAH.																
		Total for state.....	89.04	58.00	30.20	.84	89.04				89.04			1.00	.38	
1		Ogden Rapid Transit.....	11.00	10.00	.70	.30	11.00				11.00					
2		Consolidated Railway and Power.....	75.00	45.00	29.50	.50	75.00				75.00			1.00		
3		Salt Lake and Utah Valley.....	3.04	3.00		.04	3.04				3.04				.38	
VERMONT.																
		Total for state.....	80.55	76.20	.50	3.85	80.55				80.55			10.96	7.42	.37
1		Barre and Montpelier.....	8.82	8.76		.06	8.82				8.82					
2		Bellows Falls and Saxtons River.....	6.54	6.25		.29	6.54				6.54			.04	1.80	.11
3		Brattleboro Street Railway.....	5.00	4.75		.25	5.00				5.00					
4		Burlington Traction.....	11.22	10.76		.46	11.22				11.22				.17	.25
5		Rutland Street Railway.....	10.45	9.50	.50	.45	10.45				10.45			.50		
6		St. Albans Street Railway.....	13.50	12.90		.60	13.50				13.50			10.30	.20	
7		Springfield Electric Railway.....	9.11	8.14		.97	9.11				9.11			.12	2.25	.01
8		Mt. Mansfield Electric Railway.....	11.25	10.50		.75	11.25				11.25				3.00	
9		Military Post Railway.....	4.66	4.64		.02	4.66				4.66					
VIRGINIA.																
		Total for state.....	359.30	266.84	78.24	14.22	355.50		1.80	2.00	355.79	3.51	20.13	17.16	80.83	2.75
1		Charlottesville City and Suburban.....	3.70	3.50		.20	3.70				3.70				1.73	.52
2		Danville Railway and Electric.....	5.30	4.18	1.00	.12	5.30				5.30					
3		Washington, Arlington and Falls Church.....	11.92	11.33		.59	11.92				11.92				8.04	1.80

¹ For details see Supplementary Table 1.² This company failed to make a report; the information given was obtained from street-railway journals and directories.

GENERAL TABLES.

299

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STEAM RAILROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard. Maxi- Mini- mum. mum.	Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over-head.	Under-ground.	
51.45	25.53				12	8,600	5	11	37.55	22.55	.23		1.29	59.04	50.00		
	2.38		60 60	T					2.00			52		2.00			1
26.52	7.90		100 40	T, full groove	5	7,480	2	6	23.14	1.53		45	1.10	23.57	24.00		2
9.00	5.00		60 48	T	2	70	1	3	2.10	9.90		42		12.00	7.00		3
6.75	.25		60 56	T	1	350	1	1	6.31	.23	.23	50	.19	6.58	5.00		4
1.87			20 40	T													5
1.31			20 20	T	1	100	1										6
6.00	10.00		65 60	T	3	600		1	4.00	10.89		55		14.89	14.00		7
2.00																	
2.00			25 25	T													1
154.13	100.07	21.18			81	4,631	90	67	150.12	46.75	3.00		1.50	198.37	346.50		
4.25			72 35	Girder, T			1	1	3.75	.25		40		4.00	4.00		1
12.00	26.38		85 30	Girder, T, full groove	7	205	43	54	31.25	1.00		45		32.25	47.50		2
2.00	36.50		90 40	T	51	850	25	4	7.00	30.50		50	1.00	36.50	30.00		3
3.75	1.75		40 40	T	1	6			5.30			40		5.30	3.00		4
3.19			50 45	T			1		3.04			37		3.04			5
20.00	6.00		100 35	Girder, T	1	200		3	13.60	3.00	3.00	52		19.60	30.00		6
57.39	14.49	21.18	96 56	Girder, T	16	1,480	19	3	35.11	12.00		53		47.11	210.00		7
51.55	14.96		80 35	Girder, T	5	1,890		2	51.07			45	.50	50.57	22.00		8
222.95	80.32	10.00			64	6,113	17	104	204.72	43.08				247.80	121.64		
13.38			56 25	T				1	10.40			52		10.40	11.00		1
1.75	.88		40 35	T	2	30		2	2.50			58		2.50			2
32.42	2.22		74 30	T, full groove			2	21	26.50			45		26.50	12.20		3
7.75	3.91		52 35	T	6	190		14	8.45			53		8.45	8.45		4
8.00	8.20		70 60	T	11	550		11	15.80	.20		53		16.00	10.20		5
8.56	4.92		65 35	T	10	1,068	4	9	9.03	4.08		48		13.09	4.50		6
19.60	42.10		70 52	T	19	1,780		5	25.70	32.00		53		57.70	35.00		7
35.86			60 40	T	5	1,400		16	23.48	1.87		46		25.35	2.00		8
23.37	13.83	10.00	96 45	T, girder	1	200	5	2	29.05	2.00		52		31.05	7.54		9
2.86			25 25	T				1	.50	2.20		42		2.70	3.00		10
.51	.12		16 16	T													11
4.67	.43		60 56	T	1	30	2		4.86			70		4.86			12
42.55	2.96		74 30	Girder, T	8	800	4	9	33.35	.75		44		34.10	23.25		13
1.60			30 30	T													14
15.54	.75		56 36	Girder, T	1	75		6	15.09			45		15.09	4.50		15
2.71			20 16	T				3									16
2.03			20 20	T				4									17
78.75	10.29				10	295		9	17.00	15.00	25.00		1.00	57.00	50.00		
11.00			80 30	T	6	210		7	15.00	9.00	1.00	45		10.00	10.00		1
65.25	9.75		72 35	T	2	25		2	2.00	5.00	25.00	40	1.00	44.00	40.00		2
2.50	.54		42 30	T	2	80				1.00		45		3.00			3
36.78	43.77				18	2,534	4	11	26.39	48.95	.86			76.20	81.25		
6.94	1.88		60 60	T	3	222		5	5.00	3.76		52		8.76	7.00		1
1.79	4.75		60 56	T	3	265			6.25			44		6.25	4.75		2
3.50	1.50		56 48	T					.50	4.25		50		4.75	3.00		3
11.22			60 48	T				1	4.00	6.76		42		10.76	5.00		4
7.00	3.45		60 60	T				5	6.00	3.80		53		9.50	5.00		5
3.25	10.25		60 50	T	3	450	4		3.25	9.65		50		12.90	20.25		6
1.58	7.53		60 56	T	3	836			.14	7.14	.86	50		8.14	6.25		7
	11.25		60 60	T	6	761			.75	9.75		42		10.50	25.00		8
1.50	3.16		60 56	T					.50	4.14		52		4.64	5.00		9
161.41	197.89				81	32,549	39	30	207.01	50.45	6.42		19.71	244.17	376.50		
1.25	2.45		50 50	T	3	516			2.00	1.50		50		3.50	2.00		1
4.61	.69		90 40	Girder, T			1	1	4.18			44		4.18	4.82		2
1.50	10.42		67 45	T	3	43			3.78	7.55		50		11.33	24.00		3

¹ Includes 4 miles of double trolley construction.
² Includes 4 miles of steam and 1.80 miles of cable.

³ Includes 1.80 miles operated by cable.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

Number.	STATE AND NAME OF COMPANY.	TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.													
		Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Con-structed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by com-pany.	Not owned by com-pany.
VIRGINIA—Continued.															
4	Lynchburg Traction and Light.....	15.50	13.75	1.50	.25	15.50				15.50				4.00	
5	Citizens Railway, Light and Power.....	4.87	4.55	.23	.09	4.87				4.87		4.66	.55	.81	
6	Newport News and Old Point Rail-way and Electric.....	35.00	18.50	16.10	.40	35.00				35.00		4.87		3.10	
7	Bay Shore Terminal.....	12.00	11.50		.50	12.00				12.00			9.75	6.50	
8	Norfolk and Atlantic Terminal.....	19.04	9.80	9.01	.23	19.04				19.04				11.54	
9	Berkley Street Railway.....	14.01	9.32	3.69	1.00	14.01				14.01		.26			
10	Norfolk Railway and Light.....	58.03	29.44	23.42	.17	58.03				58.03				4.90	.40
11	Southside Railway and Develop-ment.....	12.85	9.50	2.33	1.02	12.85				9.34	*3.51				
12	Richmond and Petersburg Electric.....	21.93	21.56		.37	21.93				21.93		1.15		10.28	
13	Old Dominion Railway.....	12.21	11.04		1.17	12.21				12.21				5.45	
14	Norfolk, Portsmouth and Newport News.....	8.63	8.55		.08	8.63				8.63			8.00	.73	
15	Radford Water Power.....	2.98	2.98			2.98				2.98					
16	Richmond Traction.....	18.75	10.18	7.96	.61	18.75				18.75		4.95	3.58		
17	Richmond Passenger and Power.....	25.21	16.68	7.42	1.11	*25.21				25.21		2.12			
18	Virginia Passenger and Power.....	37.60	30.20	4.10	3.30	37.60				37.60				2.00	
19	Roanoke Railway and Electric.....	19.04	18.90		.14	19.04				19.04			.28	4.45	
20	Tazewell Street Railway.....	2.00	1.88		.12	2.00			2.00	2.00					.08
21	Washington, Alexandria and Mt. Vernon.....	23.73	19.50	1.48	2.75	21.93	Conduit	1.80		23.73		2.11		17.80	
WASHINGTON.															
Total for state.....		228.93	181.89	29.64	17.40	214.33	Cable..	14.60		228.93			12.04	71.91	15.69
1	Everett Railway and Electric.....	9.65	8.39	1.09	.17	9.65				9.65			.75		
2	Olympia Light and Power.....	4.18	3.62	.28	.28	4.18				4.18				.15	.10
3	Seattle Electric.....	83.19	58.18	21.61	3.40	70.24	Cable..	12.95		83.19			8.11	43.64	14.55
4	Seattle and Renton.....	13.25	12.50		.75	13.25				13.25				9.50	
5	Washington Water Power.....	33.40	27.40		6.00	33.40				33.40					
6	Spokane and Montrose Motor.....	3.15	3.13		.02	3.15				3.15					
7	Tacoma Railway and Power.....	69.11	56.53	6.18	6.40	67.46	Cable..	1.65		69.11		1.93	16.02		
8	Northern Railway and Improve-ment.....	13.00	12.14	.48	.38	13.00				13.00		1.25	2.60	1.04	
WEST VIRGINIA.															
Total for state.....		140.00	133.06	3.43	3.51	140.00				140.00		.56	24.75	22.20	1.10
1	Kanawha Valley Traction.....	7.14	7.00		.14	7.14				7.14			4.00		
2	East Liverpool and Rock Springs... ..	3.26	2.33	.98		3.26				3.26		.56		1.20	.90
3	Fairmont and Clarksburg.....	7.10	7.00		.10	7.10				7.10			4.00		
4	Camden Interstate Railway.....	30.23	29.23		1.00	30.23				30.23				3.50	
5	Parkersburg, Marietta and Inter-urban.....	29.50	28.00		1.50	29.50				29.50			11.25	12.00	
6	Wheeling and Wellsburg.....	1.77	1.75		.02	1.77				1.77					
7	Wheeling Traction.....	44.75	43.25	1.00	.50	44.75				44.75		1.50	1.50	.20	
8	Wheeling and Elm Grove.....	16.25	14.50	1.50	.25	16.25				16.25		4.00	4.00		
WISCONSIN.															
Total for state.....		416.50	299.13	103.71	13.66	*416.50				416.50			17.32	57.16	11.39
1	Wisconsin Traction, Light, Heat and Power.....	19.25	19.00		.25	19.25				19.25			7.70	14.00	
2	Ashland Light, Power and Street Railway.....	7.68	6.00	1.50	.18	7.68				7.68					
3	Chippewa Valley Electric Railroad.....	22.57	22.00		.57	22.57				22.57				8.00	
4	Fond du Lac Street Railway and Light.....	6.27	4.93	.80	.54	6.27				6.27				2.73	
5	Fox River Electric Railway and Power.....	17.13	15.71	.85	.57	17.13				17.13			3.18		.69
6	Janesville Street Railway.....	7.41	7.00		.41	7.41				7.41					
7	La Crosse City Railway.....	14.44	12.19	2.06	.19	14.44				14.44					
8	La Crosse and Onalaska.....	2.67	2.67			2.67				2.67				.74	
9	Madison Traction.....	8.50	8.00		.50	8.50				8.50					
10	Manitowoc and Northern.....	8.63	8.50		.13	8.63				8.63				1.50	
11	Marquette Gas, Electric Light and Street Railway.....	5.40	5.21		.19	5.40				5.40				.25	
12	Merrill Railway and Lighting.....	1.55	1.48		.07	*1.55				1.55					
13	Milwaukee Electric Railway and Light.....	145.50	69.64	69.63	6.23	145.50				145.50			4.46	.57	
14	Milwaukee Light, Heat and Traction.....	92.56	64.65	26.87	1.04	92.56				92.56			1.98	17.12	
15	Winnebago Traction.....	32.00	30.00		2.00	32.00				32.00				12.00	
16	Sheboygan Light, Power and Rail-way.....	20.00	17.40	2.00	.60	20.00				20.00				.25	10.45
17	Waupaca Electric Light and Rail-way.....	4.94	4.75		.19	4.94				4.94					.25

* For details see Supplementary Table 1.

* For feeder conduit system see Supplementary Table 2.

* Leased from steam railroad.

* 70 mile of this track was also operated by animal power.

GENERAL TABLES.

301

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.					BRIDGES AND TUNNELS OWNED. ¹		STREAM RAIL-ROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard.	Style of rail.	No.	Length, feet.	Protected.	Unprotected.	Span wire.	Side bracket.	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Overhead.	Underground. ⁽²⁾	
5.84	9.66		107	35 Girder, T				1	13.20	.56		40	.30	13.45	16.00		4
3.87	1.00		90	65 Girder, T	1	1,640			4.55			50		4.55	4.80		5
12.63	22.37		90	65 Girder, T	3	2,000	1	1	16.50	2.00		50		18.50	42.00		6
5.00	7.00		107	60 Girder, T	3	3,761	1		10.79	.71		43		11.50	34.50		7
7.27	11.77		90	70 T, girder	10	4,981		1	9.80			50		9.80	20.50		8
5.12	8.89		75	60 Girder, T	6	6,600	1	6	6.64	2.68		50		9.32	11.64		9
32.44	20.59		90	60 Girder, T	4	1,810	1	4	26.44	3.00		50		29.44	67.05		10
6.00	6.85		90	50 Girder, T			4		5.84	3.66		44		9.50	10.00		11
.40	21.53		96	60 Girder, T	19	2,984	5		.30	21.26		52		21.56	34.40		12
4.47	7.74		90	50 Girder, T	5	270	2	6	11.04			50		11.04	4.77		13
2.40	6.23		70	T	1	500	1	5	8.45	.10		50		8.55	5.26		14
2.98			56	T					2.92	.06		45		2.98	3.50		15
16.48	2.27		95	40 T, Groove, girder, T			4		7.76		2.42	44	10.18		10.00		16
25.21			98	95 Groove, girder			12		16.68			44	6.23	10.45	15.00		17
5.64	31.96		95	35 Girder, T	8	3,283			26.20		4.00	44	3.00	27.20	25.00		18
12.10	5.94		56	50 T	4	212	2	5	11.52	7.88		40		18.90	13.26		19
1.55	.45		24	24 T													20
4.65	19.06		97	50 Girder, T, full groove, trilby.	11	3,949	4		18.42			52		18.42	28.00		21
181.91	47.02	2.99			52	39,964	3	26	147.50	27.91				175.41	181.35		
8.53	1.12		60	60 T	1	150			8.39			44		8.39	8.00		1
3.87	.31		40	30 T	3	320		1	2.29	1.33		50		3.62	3.05		2
79.05	4.14		72	30 T	26	33,177		7	41.50	10.20		50		51.70	66.00		3
3.00	10.25		56	30 T	3	625			.75	11.75		45		12.50	15.00		4
31.80	2.10	2.89	72	30 T	1	25	2	8	27.40			50		27.40	27.40		5
3.15		.10	35	30 T					1.00	2.13		52		3.13	4.00		6
44.51	24.60		72	35 T, girder	11	3,673	1	3	54.03	2.50		50		56.53	49.90		7
8.50	4.50		56	40 T	7	1,984		7	12.14			42		12.14	8.00		8
79.46	60.54				23	11,225	10	23	92.81	40.25			3.50	129.56	107.76		
5.50	1.64		74	60 Girder, T					7.00			50		7.00	7.00		1
3.26			70	58 Girder				2	2.33			60		2.33	1.76		2
7.10			90	70 Girder, T				1	7.00			50		7.00	5.00		3
21.33	8.90		70	58 T	8	3,540	1	11	26.23	3.00		50		29.23	30.00		4
11.00	18.50		70	60 T	9	4,455	4		16.25	11.75		52	1.00	27.00	29.50		5
1.77			50	50 T					1.75			50		1.75	.50		6
27.00	17.75		90	56 Girder, T	2	2,700	4	8	29.00	14.25		50		43.25	24.00		7
2.50	13.75		90	50 Girder, T	4	530	1	1	3.25	11.25		50	2.50	12.00	10.00		8
287.46	129.04	141.25			20	6,706	69	40	235.22	60.92	2.99		46.10	258.08	230.55	79.71	
5.00	14.25		70	45 T, girder	1	800	14	7	19.00			52		19.00	19.50		1
7.68			60	48 T	2	300		3	6.00			52		6.00	.30		2
14.00	8.57		70	60 T	2	12	1	8	12.00	10.00		45		22.00	20.00		3
3.00	3.27		80	60 T, girder			2	4	4.43	.50		46		4.93	6.27		4
10.61	6.52		78	45 T, girder	1	200	3	2	11.21	4.50		52		15.71	7.00		5
7.41			35	35 T			1		6.75	.25		53		7.00	7.00		6
14.44			66	38 T, girder	1	170	1	2	12.19			44	1.00	11.19	4.00		7
1.92	.75		35	35 T			1	1	.67	2.00		42		2.67			8
7.00	1.50		56	50 T	1	75		5	7.50		.50	52	.50	7.50	9.50		9
4.25	4.38		60	60 T	2	1,200	1	4	4.25	4.25		52	.50	8.00	4.00		10
5.15	.25		60	40 T	1	16	8		5.21			53		5.21	3.00		11
1.55			38	38 Girder				1	1.48			52		1.48	.09		12
134.98	10.52	120.59	80	40 T, girder			12		66.09	2.34	1.21	50	38.20	31.44	89.23	79.71	13
35.13	57.43	20.66	75	40 T, girder	6	3,383	10		44.01	19.36	1.28	49	3.90	60.75	82.71	(¹)	14
28.00	4.00		60	48 T	3	550	11	3	15.59	14.41		42	2.00	28.00	13.20		15
6.00	14.00		70	45 T			4		17.40			52		17.40	14.00		16
1.34	3.60		50	50 T, girder					1.44	3.31		52		4.75	.75		17

¹ Includes 1.55 miles of double trolley construction.² Double trolley construction.³ Not reported.

STREET AND ELECTRIC RAILWAYS.

TABLE 94.—ROADBED, TRACK, AND ELECTRIC

Number.	STATE AND NAME OF COMPANY.	TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES.													
		Total owned and leased.	Main track.		Sidings and turn-outs.	Over-head trolley.	Other mechanical traction.		Animal.	Owned.	Leased.	Operated under track-age rights.	Constructed and opened for operation during year.	On private right of way—	
			First.	Second.			Kind.	Miles.						Owned by company.	Not owned by company.
	HAWAII.														
	Total for territory.....	28.70	27.70	.....	1.00	16.70	.....	.....	12.00	28.70	.....	.....	6.07	2.50	.....
1	Hawaiian Tramways	12.00	11.00	.....	1.00	.....	.....	.....	12.00	12.00	.....	.....	.....	.....	.....
2	Honolulu Rapid Transit and Land	14.20	14.20	.....	.....	14.20	.....	.....	.....	14.20	.....	.....	6.07	.....	.....
	Pacific Heights Electric Rwy.....	2.50	2.50	.....	.....	2.50	.....	.....	.....	2.50	.....	.....	.....	2.50	.....
	PORTO RICO.														
	Total.....	12.56	12.11	.....	.45	9.43	.....	.....	3.13	12.56	.....	.....	.....	.....	.....
1	Tramway Stock.....	3.13	8.00	.....	.13	.....	.....	.....	3.13	3.13	.....	.....	.....	.....	.....
2	San Juan Light and Transit	9.43	9.11	.....	.32	9.43	.....	.....	.....	9.43	.....	.....	.....	.....	.....

¹ For details see Supplementary Table 1.

GENERAL TABLES.

303

CONSTRUCTION, BY COMPANIES: 1902—Continued.

TRACK—CHARACTER AND LENGTH IN SINGLE-TRACK MILES—continued.						BRIDGES AND TUNNELS OWNED. ¹		STEAM RAIL-ROAD CROSSINGS, NUMBER.		ELECTRIC-LINE CONSTRUCTION, MILES.						FEEDER WIRE, MILES.		Number.	
Within city limits.	Outside city limits.	Equipped with cast-welded joints.	Weight of rails per yard.		Style of rail.	No.	Length, feet.	Pro- tected.	Unpro- tected.	Span wire.	Side bracket	Center pole.	Poles to the mile.	Steel or iron poles.	Wooden poles.	Over- head.	Under- ground.		
			Maxi- mum.	Mini- mum.															
26.20	2.50	.....				9	298	.....		10.60	6.10	.....			16.70	.....			
12.00			35	35	Full groove Girder T	8	233	.....		10.60	3.60		52		14.20				1
14.20	2.50		110	85		1	60					2.50		52		2.50			
			40	40															3
3.88	8.68	.....				2	518	1	1	9.11	.....				9.11	9.00	.....		
3.13			18	18	T T, girder.			1											1
.75	8.68		85	40		2	518		1	9.11				45		9.11	9.00	.....		2

STREET AND ELECTRIC RAILWAYS.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscellaneous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Pas-senger and ex-press.							
	UNITED STATES.....	66,784	60,290	32,658	24,259	8,134	239	1,114	2,860	1,727	793	50,699	16,085	43,273
	ALABAMA.													
	Total for state.....	370	311	175	125	8	3	21	38			233	137	27
1	Anniston Electric and Gas.....	19	15	8	7			2	2			17	2	
2	Birmingham Railway, Light and Power.....	181	142	89	51		2	11	28			101	80	
3	Decatur Street Railway.....	5	5	5								5	5	
4	Alabama City, Gadsden and Attalla.....	8	5	5				3				5	3	
5	Huntsville Railway, Light and Power.....	5	5	5								5		5
6	Mobile Light and Railroad.....	107	101	43	49	8	1		6			76	31	
7	Montgomery Street Railway.....	23	22	12	10				1			22	1	22
8	Selma Street and Suburban.....	12	11	5	6				1			7	5	
9	Tuscaloosa Belt Railway.....	10	5	3	2			5					10	
	ARIZONA.													
	Total for territory.....	19	17	5	8	4			2			12	7	6
1	Phoenix Railway.....	15	14	5	5	4			1			12	3	6
2	Tucson Street Railway.....	4	3		3				1				4	
	ARKANSAS.													
	Total for state.....	135	130	85	45			2	3			89	46	
1	Citizens Electric.....	14	12	5	7			2				9	5	
2	Fort Smith Traction.....	12	12	12								11	1	
3	Fort Smith and Van Buren.....	2	1	1					1			2		
4	Hot Springs Street Railroad.....	24	24	14	10							18	6	
5	Little Rock Traction and Electric.....	65	64	41	23				1			40	25	
6	Citizens Light and Transit.....	12	11	9	2				1			9	3	
7	Texarkana Railway.....	6	6	8	3								6	
	CALIFORNIA.													
	Total for state.....	2,066	1,850	358	279	1,203	10	48	156	2		1,139	917	1,741
1	Bakersfield and Kern Electric.....	4	4	4								4		4
2	Fresno, Belmont and Yosemite.....	5	5	3	2								5	
3	Fresno Railroad.....	7	6	3	3					1			7	
4	Nevada County Traction.....	4	4			4						4		
5	Los Angeles Electric Incline.....	2	2		2								2	
6	Los Angeles Railway.....	182	182	7	22	153						182		182
7	Los Angeles and Pasadena.....	40	29			25	4	3	8			34	6	40
8	Los Angeles Pacific Railway.....	124	77	37		40		30	17			85	39	79
9	Pacific Electric Railway.....	26	24	8	13	8			2			3	23	14
10	Los Angeles Traction.....	47	46		10	36			1			41	6	46
11	Marysville and Yuba City.....	7	7	3	4								7	
12	Monrovia Street Railway.....	2	2		2								2	
13	Monterey and Pacific Grove.....	12	12	7	4	1							12	
14	Oakland Transit Consolidated.....	159	143	1	5	137		5	11			150	9	150
15	Ontario and San Antonio Heights.....	3	3	2	1							3		
16	Pasadena and Mt. Lowe.....	13	11	1	4		6		1	1		8	6	
17	Paso Robles Street Car.....	2	2	2									2	
18	Petaluma Street Railway.....	6	6	1	5								6	
19	Pomona Street Railway.....	1	1			1							1	
20	Redlands Street Railway.....	7	6	1	1	4			1			6	1	6
21	Riverside and Arlington.....	8	8	1	4	3						5	3	5
22	Sacramento Electric, Gas and Railway.....	42	40	6	7	27			2			42		42
23	San Bernardino Valley.....	2	2		2							2		2
24	San Diego Electric Railway.....	19	18	3	3	12			1			19		19
25	Geary Street, Park and Ocean.....	58	58	24	29	5							58	34
26	California Street Cable.....	60	60	10		50							60	60
27	Presidio and Ferries.....	74	74	35	39								74	35
28	United Railroads of San Francisco.....	1,005	897	180	68	649		5	103			476	529	994
29	San Jose Railroad.....	29	27		9	18			2			24	5	
30	San Jose and Santa Clara.....	32	26	8	9	9		5	1			20	12	8
31	Santa Barbara Consolidated.....	13	11		2	9			2			9	4	13
32	Santa Cruz Electric.....	9	8		6	2			1			8	1	8
33	East Santa Cruz.....	10	8	3	5				2				10	
34	Santa Rosa Street Railway.....	17	17	8	9								17	
35	Stockton Electric.....	25	24		11	13			1			15	10	
	COLORADO.													
	Total for state.....	393	352	99	86	167		1	24	11	5	345	48	236
1	Boulder Railway and Utility.....	13	12	4	8				1			5	8	4
2	Colorado Springs and Cripple Creek.....	12	10	10								8	4	
3	Colorado Springs Rapid Transit.....	42	38	12	17	9			2	2		24	18	20
4	Denver, Lakewood and Golden.....	6	6	6								3	3	3
5	Denver City Tramway.....	267	237	48	37	152			18	7	5	267		203
6	Durango Railway and Realty.....	5	4	2	2					1		4	1	
7	Grand Junction (municipal).....	2	2	2									2	
8	Pueblo Traction and Lighting.....	46	43	15	22	6			2	1		34	12	6

¹ Exclusive of 2 steam locomotives.

GENERAL TABLES.

305

EQUIPMENT, BY COMPANIES: 1902.

NUMBER OF CARS—continued.									NUMBER OF—						Miles of exclusive telephone lines.	Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.				
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.			
63,690	7,905	5,148	30,159	19,021	11,138	62,369	55,703	6,666	2,076	1,634	8,901	5,282	235,955	5,868		
370	61		92	62	30	314	295	19	21	15	54	48	2,700			
19						15	15		5	1	1	17	145		1	
141	55		86	59	27	145	136	9		4	8	6	1,600		2	
5						5	5	5		1	32				3	
8			3	3		5	5		5	1			75		4	
5						5	5			1			22		5	
107	1					101	101			3	12	23	556		6	
23						22	22			2		2	50		7	
12						11	11		3	1			250		8	
10	6		3		3	5		5	8	1	1		2		9	
19						15	12	3		2	12	6	41			
15						12	12			1	4	6	40		1	
4						3		3		1	8		1		2	
135			27	12	15	133	126	7		7	35	21	355			
14			4	3	1	13	13			1	1		125		1	
12						12	11	1		1	3		100		2	
2						2	2								3	
24			14		14	24	24			2	4				4	
65						65	65			1	4	21	30		5	
12			9	9		11	11			1	1		100		6	
6						6		6		1	22				7	
2,016	226	656	100	100		1,842	1,064	758	65	51	334	134	8,446	175		
4						4	4			1			65	1	1	
5						5		5			12				2	
7						4		4		1	6				3	
4		4	4	4		4	4		1				26	6	4	
									1				50		5	
182	62	7				182	182			1		30	300	15	6	
40	32	3	32	32		40	40			1	8	15	150	10	7	
124	81	23	63	63		79	79		38	3		10	540	70	8	
						26	3	23		2		2	20		9	
46						47	47			1	2				10	
7						7				1	16				11	
2						2				1	4				12	
12						12				1	45				13	
150	4	40	1	1		152	150	2	2	5	5	20	400		14	
3						3	3			1		1	25		15	
11						9	9		2	1	12	10	100	5	16	
2						2				2	2				17	
6						3			3	1	2				18	
1															19	
7	2					6	6		2	1	1		40	3	20	
8	2					5	5		1	1	2		100		21	
42						41	41		1	1	2	3	100		22	
2	2					2	2			1			25		23	
19						19	19				1		60		24	
58		34				34		34		1	1				25	
60		60				60		60		2	1	2	140	5	26	
74		74				74		74			40	10	40	3	27	
1,065	38	411				902	401	501	12	14	149	8	6,000	48	28	
29						24	24				2		30		29	
32						26	24	2	2	2	3	18	125	10	30	
13						9	9			1		5	20		31	
9						8	8		1	1			20		32	
10						10		10		1	6				33	
17						17		17		2	8				34	
25						24	24		1	1	4		70		35	
344	8		210	202	8	318	313	5	10	18	17	30	3,069	17		
13						13	13				1		24		1	
8	8		10	10		8	8		6	1		5	20	14	2	
38			21	21		38	38			3	2		110		3	
6					6	6	3	3		1			10		4	
267			154	154		203	203		4	10	9		2,695		5	
4			2		2	4	4			1			10		6	
2						2		2		1	1				7	
46			17	17		44	44			1	4	25	200	8	8	

STREET AND ELECTRIC RAILWAYS.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscel-lane-ous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Passenger and ex-press.							
CONNECTICUT.														
	Total for state.....	1,380	1,196	545	647	.....	4	48	46	69	21	1,213	167	1,067
1	Branford Lighting and Water.....	(1)												
2	Connecticut Railway and Lighting.....	360	310	148	162	.....		4	18	24	4	350	10	299
3	Bristol and Plainville Tramway.....	18	16	6	10	.....				2		16	2	
4	Danbury and Bethel.....	87	34	13	21	.....			1	1	1	24	13	22
5	Greenwich Tramway.....	13	13	3	10	.....						13		13
6	Hartford and Springfield.....	90	26	13	13	.....			2	2		16	14	16
7	Farmington Street Railway.....	25	18	6	12	.....		4	1	2		21	4	20
8	Hartford Street Railway.....	262	212	111	101	.....		29	5	7	9	232	30	223
9	Hartford, Manchester and Rockville.....	39	34	13	21	.....		1	2	2		38	1	35
10	New York, New Haven and Hartford (Berlin system).....	31	31	11	18	.....	2					12	19	12
11	Meriden, Southington and Compounce.....	24	18	6	12	.....			5	1		19	5	18
12	Meriden Electric Railroad.....	55	48	21	27	.....		2	1	3	1	34	21	34
13	Middletown Street Railway.....	26	21	7	14	.....		2	1	2		14	12	
14	Manufacturers Railroad.....	2				.....			1	1		2		
15	Fair Haven and Westville.....	301	276	130	146	.....		3	6	10	6	296	5	285
16	New London Street Railway.....	27	25	7	18	.....				2		26	1	25
17	Montville Street Railway.....	18	14	6	8	.....			1	3		12	6	14
18	Norwich Street Railway.....	40	37	19	18	.....				3		28	12	29
19	Peoples Tramway.....	20	18	6	12	.....			1	1		19	1	
20	Stamford Street Railroad.....	24	23	10	13	.....				1		22	2	6
21	New York, New Haven and Hartford (New Canaan branch).....	4	4	2		.....	2					2	2	2
22	Suffield Street Railway.....	4	4	2	2	.....						4		4
23	Torrington and Winchester.....	20	14	5	9	.....		3	1	2		13	7	
DELAWARE.														
	Total for state.....	163	151	80	68	.....	3		7	1	4	155	8	
1	Wilmington and New Castle.....	15	12	4	6	.....	2		2	1		7	8	
2	Peoples Railway.....	53	50	30	19	.....	1		2		1	53		
3	Wilmington City.....	95	89	46	43	.....			3		3	95		
DISTRICT OF COLUMBIA.														
	Total for district.....	1,010	977	409	533	35		4	4	2	23	638	372	755
1	Anacostia and Potomac River.....	48	44	16	3	25					4	44	4	44
2	Brightwood Railway.....	7	5	2	3						2	2	5	2
3	Capital Traction.....	459	448	223	225			2	3		6	234	225	226
4	City and Suburban of Washington.....	57	54	39	5	10				1	2	57		54
5	Columbia Railway.....	54	52	22	30						2	52	2	52
6	Georgetown and Tennallytown.....	2									2	2		
7	Metropolitan Railroad.....	360	352	102	250			2	1		5	227	133	355
8	Washington and Great Falls.....	23	22	5	17					1		22	1	22
FLORIDA.														
	Total for state.....	111	101	50	50	.....	1	6	4			85	26	87
1	Fort Meade Street Railway.....	2	1		1			1					2	
2	Jacksonville Electric.....	48	41	27	14				2			37	6	41
3	Key West Electric.....	8	7		7				1			8		7
4	Palatka and Heights Street Railway.....	2	2	1	1								2	
5	Pensacola Electric Terminal.....	23	23	10	12		1					14	9	12
6	Tampa Electric.....	33	27	12	15			5	1			26	7	27
GEORGIA.														
	Total for state.....	497	454	228	223	3		17	25		1	408	89	67
1	Athens Electric Railway.....	12	9	6	3			1	2			10	2	
2	Georgia Railway and Electric.....	183	175	100	75				8			181	2	67
3	Augusta Railway and Electric.....	75	67	34	33				7		1	44	31	
4	Columbus Railroad.....	29	28	7	18	3			1			21	8	
5	Covington and Oxford.....	7	4	3	1			3					7	
6	Macon Railway and Light.....	51	48	24	24				3			41	10	
7	City Electric Railway.....	11	10	5	5				1			9	2	
8	Savannah Electric.....	118	105	45	60			10	3			95	23	
9	Valdosta Street Railway.....	7	6	2	4			1				7		
10	Washington Street Railway.....	4	2	2				2					4	
IDAHO.														
	Total for state.....	3	3	3								3		3
1	Boise Rapid Transit.....	3	3	3								3		3
ILLINOIS.														
	Total for state.....	7,778	7,021	3,815	3,112	76	18	251	269	151	86	3,315	4,463	3,214
1	Alton Railway, Gas and Electric.....	21	15	15					6			18	3	7
2	Elgin, Aurora and Southern.....	76	64	44	20				9	2	1	72	4	
3	Bloomington and Normal.....	34	32	15	13	4			1		1	31	3	

¹ Cars furnished and operated by another company.

GENERAL TABLES.

307

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.	
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.		
1,364	188	21	574	500	74	1,348	1,348		34	55	43	86	6,196	47	
360	49		150	117	33	360	360		4	15	13	15	2,000		1
18			6	6		16	16		1	8	1		50		2
37	16		13	10	3	37	37		1	2	2		45		3
13			3	3		13	13			1			65		4
30	16		13	13		30	30			2			265	13	5
22	3		6	6		25	25			2			75		6
262	49	1	126	117	9	262	262		7	5	11		1,900		7
39	1		13	13		35	35		1	1			50	17	8
31	31		13	13		31	31		8	1					9
24	5		6	6		24	24			2			100		10
51			22		22	51	51		1	3	3	25	400		11
24		2	14	7	7	21	21		1	3	1	5	100		12
2															13
301			130	130		301	301			6	6	24	875		14
27			7	7		25	25		2	1	1	1	25	1	15
14	14		6	6		14	14			1		5	20		16
37		8	19	19		37	37		1	2	3	1	30		17
20		6	6	6		20	20		3	1			85	16	18
24		4	10	10		23	23			2	2		30		19
4	4		4	4		4	4		5	1					20
4			2	2		4	4								21
20			5	5		15	15			1		10	80		22
163	10		83	83		160	160		4	5	5	8	362	26	23
15			6	6		13	13		3	1	1	4	62		1
53			31	31		53	53			2			150	26	2
96	10		46	46		94	94		1	2	4	4	150		3
1,010			342	341	1	994	984	10	20	16	30	146	3,501		
48			41	41		44	44			2	2	9	125		1
7			2	2		5	5		2	1	1	96			2
459			121	120	1	453	453	10	1	6	10	21	1,000		3
57			49	49		54	54		7	2	2	16	315		4
54			22	22		52	52		2	1	2		810		5
2										1			61		6
360			102	102		354	354		1	2	13	5	1,478		7
23			5	5		22	22		7	1			212		8
106	3	1	1		1	101	89	12	10	6	10	14	1,233		
2						1		1			2				1
41						41	41		3	1	2	12	203		2
8						7	7		1	1	2	2	280		3
2						2		2		1	3				4
23			1		1	21	12	9	3	2			50		5
29	3	1				29	29		3	1	1		700		6
496	23		111	111		476	470	6	29	16	45	178	3,079	4	
12			6	6		9	9			1	3		125		1
183	23		100	100		175	175			3	12	90	1,100		2
75						75	75		2	2	4	45	500	1	3
29						28	28		7	1	2	16	700		4
7						4		4	3	2	8				5
51			5	5		49	49			2	4	15	320	3	6
9						10	10		5	1		7	130		7
118						118	118		12	2	6	5	200		8
7						6	6			1			4		9
4						2		2		1	6				10
3			3	3		3	3			1			7		
3			3	3		3	3			1			7		1
5,790	1,529	1,485	3,841	1,918	1,923	7,216	4,601	2,615	212	96	536	369	22,388	311	
21			18	18		18	18			1	1	8	75		1
72	7		44	44		72	72		5	2		10	400	40	2
34			20	20		31	31			2	2	20	100		3

* Passenger cars furnished by another company.

TABLE 95.—CARS AND MISCELLANEOUS

		NUMBER OF CARS.												
Number.	STATE AND NAME OF COMPANY	Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscellaneous.	Snow-plow.	Sweep-er.	Electric equipment.		With fenders.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Passenger and ex-press.							
ILLINOIS—Continued.														
4	Mechanicsburg and Buffalo	3	2	1			1	1					3	
5	Cairo Electric Railway	18	13	7	6				3	2		11	7	11
6	Egypt Electric	8	7	4	3				1			5	3	4
7	Centralia and Central City	10	10	4	6								10	
8	Urbana and Champaign	81	27	20	7							17	14	17
9	Chicago City Railway	1,953	1,807	862	945			8	68	54	16	637	1,316	872
10	Chicago Union Traction	2,865	2,676	1,199	1,447	30		16	73	56	44	1,033	1,832	1,297
11	Chicago Consolidated Traction	370	337	166	171				12	10	11	282	88	266
12	Calumet Electric Street Railway	239	217	52	156	9			16	4	2	135	104	130
13	Chicago Electric Traction	51	45	20	25				3	2	1	51		46
14	Chicago General Railway	34	29	29					3	1	1	21	13	20
15	Chicago General Electric Railway	1	1	1								1		
16	Suburban Railroad	39	37	37					1		1	16	23	39
17	Northwestern Elevated Railroad	203	202	202					1			52	151	
18	South Side Elevated Railroad	212	210	210					2			180	32	
19	Metropolitan West Side Elevated	361	351	351				9	1			90	271	
20	South Chicago City Railway	110	104	48	56				2	1	3	63	47	59
21	Chicago and Milwaukee	61	54	15	15	15	9	1	4	1	1	28	33	25
22	Lake Street Elevated Railroad	141	139	139					2			37	104	
23	Chicago and Joliet	64	56	32	16	4	4	2	3	2	1	45	19	
24	Northern Electric Railway	4	3	3					1			3	1	3
25	Danville Railway and Light	32	29	19	10				3			27	5	
26	Danville, Paxton and Northern	7	6	6					1			6	1	
27	Decatur Traction and Electric	32	30	18	12				1		1	23	9	
28	East St. Louis Railway	37	34	34					2	1		37		37
29	St. Louis and Belleville	1213						209	4				213	
30	East St. Louis and Suburban	24	17	13	2		2	2	5			22	2	22
31	St. Louis and East St. Louis	8	8	8								8		8
32	Granite City and St. Louis	20	15	10	5				4	1		14	6	10
33	Freeport Electric	21	11	6	5				8	1	1	10	11	
34	Galesburg Electric Motor	29	27	13	14				1	1		18	11	17
35	Chicago, Harvard and Geneva Lake	12	8	4	3		1	2	1	1		7	5	6
36	Jacksonville Railway	21	18	10	8				3			9	12	
37	Kankakee Electric Railway	5	5	4	1							5		
38	North Kankakee Light and Railway	10	7	5	2				2	1		4	6	
39	Lincoln Street Car	3	3	3								3		1
40	Coal Belt Electric Railway	11	8	6	1		1	1	2			8	3	
41	Murphyboro Street Railway	2	2	1	1								2	
42	Ottawa Railway, Light and Power	16	16	9	7							12	4	
43	Peoria and Prospect Heights	25	24	12	12					1		24	1	24
44	Central Railway	160	150	76	74				3	7		107	53	150
45	Peoria and Pekin Terminal	10	10			10						10		10
46	Quincy Horse Railway	47	42	18	24				4	1		24	23	34
47	Rockford Railway, Light and Power	47	44	20	24				2		1	39	8	47
48	Rockford and Belvidere	7	6	6						1		7		
49	Springfield Consolidated	54	52	32	16	4			2			52	2	52
50	Peoples Light and Railway	16	11	6	5				5			11	5	
INDIANA.														
Total for state		1,146	998	515	467	4	12	8	114	11	15	818	328	645
1	Brownstown and Ewing	1	1	1								1		
2	John S. Crump	8	7	7					1			4	4	
3	Evansville Electric Railway	92	87	40	47				4		1	65	27	64
4	Fort Wayne Traction	82	76	26	50				2		4	43	39	76
5	Fort Wayne and Southwestern	8	7	7					1			8		7
6	Hammond, Whiting and East Chicago	12	11	11							1	12		11
7	Indianapolis Street Railway	317	298	142	156				14		5	303	14	298
8	Broad Ripple Traction	(*)												
9	Indianapolis, Shelbyville and Southeastern	8	7	7					1			7	1	7
10	Indianapolis and Eastern	11	9	7			2	1	1			10	1	10
11	Union Traction	242	172	110	62			4	64	2		135	107	50
12	Indianapolis, Greenwood and Franklin	9	8	6			2		1			9		8
13	Jeffersonville City Railway	11	11	9	2								11	
14	Kokomo Railway and Light	17	16	7	9				1			9	8	
15	Lafayette Street Railway	35	31	14	17				2	2		22	13	
16	Logansport Railway	15	14	8	6				1			13	2	
17	Logansport, Rochester and Northern	16	16	6	10							6	10	
18	Madison Light and Railway	4	4	4								4		
19	Lake Cities	4	3	2	1					1		3	1	
20	Highland Railroad	6	6	1	5							3	3	
21	New Albany Street Railroad	21	20	13	7						1	17	4	4
22	Richmond Street and Interurban	44	36	16	16	4		1	6	1		21	23	12
23	Indiana Railway	72	63	32	31			1	4	2	2	45	27	64
24	Terre Haute Electric	73	60	23	29		8	1	9	2	1	53	20	25
25	Vincennes Citizens	14	14	5	9							9	5	
26	Wabash River Traction	16	13	7	6				2	1		10	6	9
27	Washington Street Railway	8	8	4	4							7	1	
IOWA.														
Total for state		858	675	391	281		3	41	115	16	11	535	323	477
1	Boone Electric	10	7	5	2				2	1		5	5	3
2	Burlington Railway and Light	58	50	16	34				7	1		27	31	23
3	Cedar Rapids and Marion City	29	23	22			1		4	2		25	4	22
4	Peoples Street Railway	3	3	3									3	
5	State Electric	28	25	12	13					1		16	12	
6	Omaha and Council Bluffs	78	71	41	30			1	3		3	55	23	52

* Exclusive of 2 electric locomotives.

GENERAL TABLES.

309

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Miles of exclusive telephone lines.	Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horsea.	Lamps for buildings, shops, car houses, etc.				
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.			
3			2		2	2		2		1	3				4	
18			7		7	13		13							5	
8			4		4	7		7		1			20		6	
10			4		4	10		10		1	10				7	
31			20	12	8	31	31			2	2	2	100		8	
612	60	1,281	862	60	802	1,807	1,019	788		7	188	70	2,700	30	9	
2,451	210	204	1,207	483	724	2,807	1,020	1,787		15	275	100	1,500		10	
370			166	158	8	337	337			4	3	20	750		11	
239	9		61		20	226	226		2	5	5		570	62	12	
51			21	1	20	51	51			1			300		13	
31			20		20	30	30				5		200		14	
1			1		1	1		1		1					15	
39	16		9		9	37	37			1			400	8	16	
203	203		202	202		202	202		31	1		24	1,200	8	17	
	212		210	210		210	210		23	1			1,500	8	18	
361	361		351	351		351	351		58	3			6,000	16	19	
110	3		48	48		108	108		1	2	2		495	11	20	
61	30		17	16	1	67	32	25	5	3		25	500	30	21	
141	141		139	139		139	139		54	1		12	1,285	10	22	
64	16		45	45		61	61			4	3	20	300	31	23	
8			3		3	3	3						50		24	
32			17		17	29	29		2	2	3	10	200		25	
6	6		6	6		6	6		2	1			10	12	26	
32			18	18		32	32		2	2		10	110	2	27	
37			34		34	35	35			1	2	2	78		28	
213	213														29	
24	19		19	19		24	24			2			216	18	30	
8			8	8		8	8			1			16		31	
14			12	10	2	14	14		8	1	1	10	100	2	32	
21			6	6		11	11			1			100		33	
29			13	1	12	29	29		3	1	3		60		34	
12	7		8	1	7	11	11		2	1		5	15	11	35	
21			9		9	18	18			1	2		50		36	
5			5		5	5	5			1			18		37	
7			5	3	2	7	7		1	1			15		38	
3			3		3	3	3		1	1			19		39	
11			7	7		8	8		2	2		10	25	14	40	
2			1		1	2		2		1	4				41	
16			9	2	7	16	16			1			100		42	
24			12		12	24	24						240		43	
160			76		76	150	150		1	10	4	10	2,076		44	
10	10		10	10		10	10		10	1			100		45	
47			18	18		47	47			1	2	1	100	3	46	
47			20		20	47	47		1	3	5		50		47	
7	6		6	2	4	6	6		2		1				48	
52			32		32	52	52			2	9		200		49	
16			6		6	11	11		1	1	1		45		50	
1,121	125		524	286	238	1,015	999	16	40	50	62	96	5,843	372		
1			1		1	1		1			3				1	
8			4		4	8		4		1		2	40		2	
91			37	37		87	87			3	4		250		3	
82			26	26		76	76			7	6	18	180		4	
8	8		5		5	8	8		2	1			200	26	5	
12			11	11		11	11			1			30	6	6	
317	35		142		142	303	303			4	16	20	2,500		7	
7	7		7		7	7			1	1	1		50		8	
10	10		10	10		10	10		3	1			102	27	9	
228	44		121	82	39	187	157		12	5	4	30	1,000	17	10	
9	8		8	8		9	9		4	1		1	50	222	11	
11						11		11		1	20			18	12	
17			7		7	17				1		2	40		13	
35			14	14		31	17			2	2		75		14	
15			8	6	2	15	15		1	1			50	6	15	
16			6	6		16	16			2			10		16	
4			4	4		4	4			1			40		17	
4			2		2	3	3			1			31		18	
6			1		1	6	6			1			40		19	
21			13		13	21	21		1	1	1		30		20	
44	4		16	12	4	16	16		7	3			125	20	21	
64			33	32	1	68	68		6	5		2	300		22	
73	9		32	24	8	64	64			2	5	20	250	16	23	
14			5		5	14	14		1	1			50		24	
16			7	6	1	14	14		1	1			285	15	25	
8			4	4		8	8			1			5		26	
800	21	14	387	140	247	709	705	4	21	38	43	65	3,552	69		
10		10	5	4	1	7	7			2		4	100		1	
50			16	12	4	50	50			1	2		92		2	
29			23		23	26	26		1	3	2		50	6	3	
3			2		2	2		2		1	12				4	
28			9		9	25	25			3	1		60		5	
68	6		37	34	3	75	75			3		13	332	2	6	

* Cars rented.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscellaneous.	Snow-plow.	Sweep-er.	Electric equipment.		With fenders.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Passenger and ex-press.							
IOWA—Continued.														
7	Tri-City Railway	168	156	88	68				4	4	4	117	51	156
8	Des Moines City Railway	134	81	70	11				49	4		87	47	80
9	Interurban Railway	18	4	4					14			6	12	6
10	Union Electric	44	42	19	23				1		1	28	16	30
11	Fort Dodge Light and Power	1	1	1								1		1
12	Fort Madison Street Railway	12	11	4	7					1		7	5	
13	Independence and Rush Park	6	4	2	2				2			2	4	
14	Keokuk Railway and Power	24	24	12	12							13	11	
15	Marshalltown Light, Power and Railway	8	8	5	3							6	2	6
16	Mason City and Clear Lake	16	12	5	6	1	4					7	9	
17	Citizens Railway and Light	30	26	10	16				3	1		21	9	26
18	Ottumwa Traction and Light	35	32	13	19				2		1	33	2	32
19	Red Oak Street Railway	2	2	2									2	
20	Sioux City Traction	72	65	43	22				4	1	2	56	16	30
21	Tama and Toledo	11	3	2	1				8			3	8	3
22	Waterloo and Cedar Falls	171	25	12	12	1	36	10				20	51	7
KANSAS.														
	Total for state	232	207	141	66		10	7	8			147	85	48
1	Arkansas City Street Railway	5	5	3	2								5	
2	Atchison Railway, Light and Power	19	16	7	9				3			9	10	
3	Fort Scott Consolidated Supply	12	11	6	5				1			6	6	
4	Hutchinson Street Railway	14	13	7	6					1			14	
5	Iola Electric Railroad	6	5	4	1				1			4	2	4
6	Electric Railway and Ice	7	7	4	3								3	
7	Kansas City-Leavenworth	45	35	30	5		10					45		
8	Pittsburg Railroad	12	12	8	4							10	2	
9	Consolidated Street Railway	4	4	4								4	4	
10	Topeka Railway	71	62	41	21				2	7		44	27	44
11	Wichita Railway and Light	31	31	21	10							25	6	
12	Union Street Railway	6	6	6								6	6	
KENTUCKY.														
	Total for state	976	889	617	193	73	1	2	59	17	9	704	272	620
1	Bowling Green Railway	8	7	6	1				1			7	1	
2	Cincinnati, Newport and Covington	142	132	30	30	72			6		4	142		142
3	Frankfort and Suburban	6	5	5				1				6		
4	Henderson Street Railway	12	11	9	2				1			9	3	
5	Lexington Railway	42	39	18	21				2	1		29	13	42
6	Georgetown and Lexington	6	5	3	1		1		1			6		
7	Louisville Railway	648	606	492	113	1			22	15	5	425	223	425
8	Louisville, Anchorage and Pewee	13	10	10				1	2			11	2	11
9	Kentucky and Indiana	18	14	14					4			14	4	
10	Maysville Street Railroad	12	12	5	7							9	3	
11	Owensboro City Railroad	21	19	6	13				2			16	5	
12	Paducah City Railway	48	29	19	10				18	1		30	18	
LOUISIANA.														
	Total for state	670	626	551	69	6		43			1	595	75	579
1	Baton Rouge Electric and Gas	7	7	3	3	1						7		
2	Lake Charles Street Railway	3	3	3									3	
3	St. Charles Street Railroad	83	78	78					4		1	79	4	79
4	Orleans Railroad	31	30	25		5			1			31		31
5	New Orleans Railways	365	356	307	49				9			331	34	331
6	New Orleans and Carrollton	162	134	122	12				28			138	24	138
7	Algiers, McDonoghville and Gretna	4	4	4								4		
8	Shreveport Belt Railway	15	14	9	5				1			9	6	
MAINE.														
	Total for state	598	476	199	274	1	2	33	43	46		469	129	11
1	Augusta, Winthrop and Gardiner	22	19	8	10		1		2	1		22		
2	Public Works	27	24	11	13				1	2		27		
3	Penobscot Central Railway	27	15	13	2			12				9	18	
4	Bangor, Orono and Old Town	20	16	8	8				2	2		19	1	
5	Bangor, Hampden and Winterport	13	9	3	6				3	1		13		
6	Biddeford and Saco	27	24	5	19					3		18	9	
7	Calais Street Railway	9	7	3	4				1	1		9		
8	Benton and Fairfield	9	1	1				7	1			4	5	
9	Fryeburg Horse Railway	6	6	3	3								6	
10	Atlantic Shore Line	2	2	1	1							2		
11	Lewiston, Brunswick and Bath	87	70	25	45			2	6	9		60	27	
12	Norway and Paris	4	4	2	2							4		
13	Portland Railroad	238	207	87	120			1	13	17		196	42	
14	Portsmouth, Kittery and York	21	17	6	11			1	1	2		21		
15	Rockland, Thomaston and Camden	30	18	8	10			4	5	3		20	10	
16	Sanford and Cape Porpoise	26	15	7	8			2	8	1		18	8	
17	Skowhegan and Norridgewock Railway and Power	7	5	2	3			1		1		6	1	2
18	Somerset Traction	13	8	2	4	1	1	3		2		11	2	9
19	Waterville and Fairfield Railway and Light	10	9	4	5					1		10		

1 Exclusive of 2 steam locomotives.

GENERAL TABLES.

311

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.	Number.
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.		
156	2		88	20	68	168	168			3	10		875		7
134			70	14	56	91	91		1	3	7	18	500		8
6	4	4	6	1	5	6	6		3			4	106	22	9
42			19	19		43	43			2		6			10
1			1			1	1		1				30		11
11			4		4	11	11			1			10		12
4			2	2		4	4			1			18		13
24			8		8	24	24			1			100		14
8			5		5	8	8			1		2	50		15
16	10		8	8		14	14		3	1			40	12	16
27			10		10	26	26			1			25		17
35			13	13		33	33			2		2	150		18
2			2		2	2		2			4				19
72			43		43	65	65		7	3	4	15	415	4	20
3			2	2		3	3		1	1		1	100		21
71	2		14	11	3	25	25		4	4	1		500	23	22
227			99	34	65	166	146	20	7	16	79	34	462	2	
5			3		3	3		3		1	4				1
16			7		7	16	16			1		7	29		2
12			4		4	12	12			2	4	2	75	1	3
13			7		7	7		7		2	40				4
5			4		4	4	4		2	1			35		5
7			4		4	7	7		1	1			40		6
45															7
12			7		7	12	12			2	1	1	58		8
4			2		2	4		4		1	7				9
71			36	2	34	64	64		8	2	4	20	200	1	10
31			21	21		31	31		1	2	1	4	50		11
6			4		4	6		6		1	18				12
975			522	503	19	929	895	34	17	26	85	78	3,435	14	
8	15	10				8	8		1	1			50		1
142		10	132	132		142	142		2	2	4	12	1,465		2
6						6	6			1		5	15		3
11			6	6		11	11			1			25		4
42			18	18		39	39		1	2	3	2	100		5
6	3		4	4		6	6			1		3	20		6
648			330	330		616	582	34	2	12	75	50	1,000		7
13	11		10	5	5	11	11		4	2		6	300	14	8
16			14		14	14	14		5	1			85		9
12	1					12	12			1			25		10
21			6	6		19	19			1	2		100		11
48			2	2		45	45		2	1	1		250		12
635						627	620	7	18	14	81	35	757	1	
7						7	7			1	3		75	1	1
3						3		3		1	17		2		2
81						78	78			1	3	10	100		3
31						30	30		3	1	2		30		4
352	10					356	356		6	6	35		150		5
142						135	135		2	2	3	20	250		6
4						4		4	3	1	17				7
15						14	14		2	1	1	5	150		8
566			184	184		545	539	6	59	38	28	120	2,809	166	
22			9	9		22	22		6	2			185	2	1
27			11	11		26	26		1	2	2	2	59		2
27	3		13	13		15	15		4	1			50	26	3
19			8	8		18	18		4	2			12		4
13			3	3		12	12		1	1		10	100	5	5
27			5	5		27	27		1	1	1		25		6
9			3	3		9	9			1			30		7
3			1	1		3	3		2	1			10		8
6						6		6		2	1				9
2			1	1		2	2		1					2	10
87	1		27	27		83	83		14	4			1,200	32	11
4			2	2		4	4			1			5		12
238	24		69	69		223	223		2	10	23	100	600	18	13
21			7	7		21	21		7	2			125	15	14
30			8	8		28	28		3	2		4	50	25	15
22	4		7	7		13	13		5	2			150	22	16
6			2	2		6	6		1	1			10	4	17
13	1		4	4		12	12		4	1			130	13	18
10			4	4		10	10		1	2	1	4	68	1	19

* This company failed to make a report; the information given was obtained from street-railway journals and directories.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggre- gate.	Passenger.					Ex- press, freight, and mail.	Work and miscel- laneous.	Snow- plow.	Sweep- er.	Electric equipment.		With fend- ers.
			Total.	Closed.	Open.	Combination.						With.	With- out.	
						Closed and open.	Pas- senger and ex- press.							
MARYLAND.														
	Total for state.....	1,589	1,487	622	664	196	5	42	27	1	32	1,583	56	1,515
1	United Railways.....	1,488	1,418	590	632	196		12	26		32	1,475	13	1,475
2	Cumberland Electric Railway.....	19	17	9	8				1	1		15	4	10
3	Frederick and Middletown.....	43	13	4	7		2	30				7	36	
4	Kensington Railway.....	2	2	2								2		
5	Cumberland and Westernport.....	4	4	3			1					4		
6	Hagerstown Railway.....	14	14	5	7		2					11	3	11
7	Baltimore and Washington.....	5	5	2	3							5		5
8	Washington and Glen Echo.....	10	10	3	7							10		10
9	Washington and Rockville.....	(1)												
10	Washington, Woodside and Forest Glen.....	4	4	4								4		4
MASSACHUSETTS.														
	Total for state.....	8,310	7,275	3,401	3,869		5	94	197	740	4	7,801	509	7,021
1	Amherst and Sunderland.....	12	9	3	6			2		1		9	3	9
2	Interstate Consolidated.....	55	49	21	28					6		52	3	46
3	Lexington and Boston.....	54	47	16	31				1	6		54		47
4	Old Colony Street Railway.....	933	795	309	486				50	88		889	44	840
5	Boston and Northern.....	1,392	1,193	477	716			22	20	156	1	1,219	173	1,091
6	Boston Elevated Railway.....	3,612	3,281	1,734	1,547			11	30	290		3,487	125	3,131
7	Lowell and Boston.....	17	14	6	8				1	2		13	4	11
8	New York, New Haven and Hartford Railroad.....	28	28	24		4						9	19	9
9	Blue Hill Street Railway.....	18	15	8	7				2	1		11	7	15
10	Hoosac Valley.....	32	29	14	15				1	2		31	1	29
11	Concord, Maynard and Hudson.....	17	14	7	7				1	2		17		15
12	Conway Electric Railway.....	16	5	3	2			9	1	1		5	11	
13	Cottage City and Edgartown.....	8	7	3	4				1			7		
14	Norfolk Western Railway.....	17	13	10	3				2	2		11	6	8
15	Greenfield and Deerfield.....	6	4	4					2			4	2	4
16	Providence and Fall River.....	19	16	6	10					3		19		16
17	Dartmouth and Westport.....	24	19	7	12				3	2		24		22
18	Fitchburg and Leominster.....	62	53	22	31				5	3	1	61	1	53
19	Framingham Union Street Railway.....	17	15	6	9				1	1		14	3	13
20	Gardner, Westminster and Fitchburg.....	25	21	9	12			1	1	2		24	1	21
21	Greenfield and Turners Falls.....	17	15	7	8				1	1		16	1	15
22	Haverhill and Southern New Hampshire.....	12	11	5	6					1		12		11
23	Haverhill, Georgetown and Danvers.....	7	6	3	3					1		7		6
24	Haverhill and Amesbury.....	67	54	18	36				4	9		50	17	43
25	Holyoke Street Railway.....	130	114	42	72				7	8	1	130		114
26	Lawrence and Reading.....	13	12	4	8					1		13		12
27	Lawrence and Methuen.....	14	12	5	7					2		14		12
28	Middleton and Danvers.....	2	2	2								2		2
29	Norfolk and Bristol.....	27	23	9	14				2	2		25	2	23
30	Marlboro Street Railway.....	35	28	11	17				1	6		34	1	32
31	Marlboro and Westboro.....	15	12	6	6				1	2		15		13
32	Medford and Medway.....	10	8	5	3					2		7	3	8
33	Middleboro, Wareham and Buzzards Bay.....	30	23	6	17			2	1	4		30		23
34	Milford, Attleboro and Woonsocket.....	29	26	10	16					3		29		26
35	Milford and Uxbridge.....	49	40	20	20			2		7		48	1	40
36	Natick and Cohasset.....	29	25	13	12				1	3		28	1	25
37	South Middlesex Street Railway.....	39	34	15	19				1	4		33	6	34
38	Union Street Railway.....	126	112	51	61				6	7	1	122	4	115
39	New Bedford and Onset.....	21	18	6	12				1	2		20	1	19
40	Citizens Electric Railway.....	49	43	16	27			3		3		45	4	37
41	Georgetown, Rowley and Ipswich.....	20	17	8	9					3		20		17
42	Commonwealth Avenue.....	38	34	13	21				1	3		38		34
43	Wellesley and Boston.....	15	14	5	9					1		15		14
44	Newton and Boston.....	28	26	11	15				2			28		28
45	Newton Street Railway.....	53	46	21	25				3	4		53		49
46	Northampton Street Railway.....	56	43	21	21		1	1	8	4		56		46
47	Northampton and Amherst.....	17	14	6	8				1	2		13	4	14
48	Haverhill and Andover.....	(2)												
49	Norton and Taunton.....	24	18	10	8				2	4		23	1	18
50	Athol and Orange.....	11	10	5	5					1		11		10
51	Pittsfield Electric.....	37	29	13	16				6	2		33	4	29
52	Plymouth and Sandwich.....	4	4	2	2							4		4
53	Brockton and Plymouth.....	30	25	9	16				2	3		27	3	27
54	Norwood, Canton and Sharon.....	4	4	4								4		4
55	Shelburne Falls and Coleraine.....	14	5	3	2			8		1		4	10	5
56	Southbridge and Sturbridge.....	13	11	6	5				1	1		12	1	11
57	Hampshire Street Railway.....	(2)												
58	Springfield Street Railway.....	254	219	105	114			16		19		231	23	235
59	Springfield and Eastern.....	43	34	13	21				3	6		41	2	32
60	Stoughton and Randolph.....	3	3		3							3		3
61	East Taunton Street Railway.....	9	6	2	4				1	2		9		6
62	Bristol County.....	19	15	7	8				2	2		18	1	14
63	Templeton Street Railway.....	17	13	7	6			2		2		17		14
64	Martha's Vineyard.....	2	2	2								2		2
65	Upton Street Railway.....	(2)												
66	Reading, Wakefield and Lynnfield.....	(2)												
67	Hampshire and Worcester.....	13	12	4	8					1		13		4
68	Warren, Brookfield and Spencer.....	20	16	6	10				2	2		19	1	16
69	Webster and Dudley.....	10	8	2	6				1	1		9	1	8
70	Worococo Street Railway.....	32	28	11	17				2	2		30	2	28
71	Linwood Street Railway.....	3	3	3								3		3
72	Worcester Consolidated.....	362	315	139	176			5	10	32		362		330
73	Worcester and Blackstone Valley.....	22	18	8	10			1	1	2		19	3	18
74	Worcester and Southbridge.....	32	21	9	12			9		2		24	8	21
75	Worcester and Webster.....	20	17	7	10				1	2		20		17

¹ Cars furnished by another company.

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Miles of exclusive telephone lines.	Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.				
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.			
1,335	4	241	121	110	11	1,557	1,557	.....	17	30	72	57	4,360	8		
1,234		241	86	86		1,488	1,488			24	72	50	4,000		1	
19			9		9	17	17		2	1			95		2	
43			4	4		13	13		5	3			45		3	
2			2	2		2	2		1						4	
4	4		4	4		4	4		1	1			120		5	
14			7	7		14	14		1			7	50		6	
5			2		2	5	5		2				40		7	
10			3	3		10	10		1				10		8	
									3						9	
4			4	4		4	4		2						10	
8,274	1,207	5	3,244	3,232	12	7,709	7,709	.....	129	236	421	594	34,212	891		
12	1		3	3		12	12			1			30	10	1	
49			16	16		46	46			2			195		2	
54	43		16	16		48	48		4	2			250		3	
933	143		306	306		889	889			37	20		3,133	120	4	
1,392	196		388	376	12	1,065	1,065			45	44	5	3,043	182	5	
3,612	150		1,725	1,725		3,497	3,497		25	33	279	353	19,096		6	
17	13		6	6		16	16			1			45		7	
28	28		4	4		28	28		23	1					8	
18	11	1	6	6		16	16		1	1			125		9	
32	4		14	14		32	32		1	3	1	3	25		10	
17	14		7	7		17	17		3	1			80		11	
16			3	3		7	7			1					12	
7						4	4			1			1		13	
15			5	5		15	15		1	1			85		14	
6	4					4	4			1			50		15	
19	16		6	6		19	19			1			440		16	
24	18		7	7		24	24		1						17	
62	18		22	22		62	62		4	2	6	16	70		18	
17	1		6	6		14	14			1			20		19	
25	5		9	9		25	25			2		10	100		20	
17			7	7		17	17			1			100		21	
12	12		5	5		12	12								22	
7			3	3		7	7		1	1					23	
67	6		15	15		50	50		8	4	5		170		24	
130	12	4	42	42		130	130		2	5	4	30	550		25	
13	10		4	4		12	12			1			25		26	
14	14		5	5		14	14		1				5		27	
2			2	2		2	2								28	
27	3		9	9		25	25		2	1			130		29	
35	1		11	11		34	34			2			60		30	
15	12		6	6		15	15		1	1	1	15	163		31	
10	3		2	2		5	5		1						32	
80	24		6	6		29	29			1	2		88		33	
29	14		10	10		29	29			4			35		34	
49	15		20	20		48	48		2	4			100		35	
29	1		13	13		28	28		1	2	1		15		36	
39	13		15	15		37	37		2	3			50		37	
126	32		50	50		122	122			5	5	40	400		38	
21	19		6	6		21	21		7	1			150		39	
49	5		16	16		45	45		2	3	4		45		40	
20			8	8		20	20		2	1			70		41	
38	16		13	13		35	35		3	2	1		150		42	
15			5	5		15	15		2				60		43	
28	6		11	11		28	28		3	2	3	5	150		44	
53			21	21		49	49		3	2	3		270		45	
56	12		22	22		56	56			3	3		200		46	
17	4		6	6		17	17			1	1		60		47	
															48	
23			10	10		23	23			2			200		49	
11			5	5		11	11			1			15		50	
37	6		13	13		33	33			2	3		50		51	
4			2	2		4	4		8	1			5		52	
30	16		9	9		30	30			3	1		200		53	
4			4	4		4	4		1	1			10		54	
14			2	2		5	5			3			30		55	
13			6	6		12	12			1		10	100		56	
															57	
254	71		105	105		254	254		2	10	8	20	600		58	
43	17		13	13		43	43		3	1	1		40		59	
3	3		3	3		3	3		1						60	
9	4		2	2		9	9			1			15		61	
18	16		7	7		16	16			1		10	54		62	
17	2		6	6		16	16						30		63	
2			1	1		2	2								64	
															65	
13	6		4	4		13	13			1	1		30		66	
20			6	6		20	20			2		10	90		67	
10			2	2		9	9		1	1			30		68	
32	7		11	11		32	32		1	1	1		150		69	
3	1		3	3		3	3						70		70	
348	114		124	124		362	362			14	17	25	1,350		71	
22	8		8	8		22	22			1			165		72	
21	21		9	9		21	21		10	1		20	1,000		73	
20	17		7	7		20	20		1	1	1	5	150		74	

*Cars rented.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscel-lane-ous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Pas-senger and ex-press.							
MICHIGAN.														
	Total for state	1,757	1,531	919	588	15	9	48	132	38	8	1,466	291	1,287
1	Adrian Street Railway	7	7	5	2							5	2	2
2	Bay Cities Consolidated	47	43	20	23				2	1	1	41	6	43
3	Benton Harbor and St. Joseph	30	29	11	18						1	15	15	
4	Detroit United Railway	920	838	533	305			12	54	16		905	15	910
5	Detroit and Port Huron Shore Line	97	56	39	17			8	32	1		58	39	58
6	Detroit, Ypsilanti, Ann Arbor and Jackson	37	34	29	4		1	2	1			37		37
7	Escanaba Electric Railway	17	12	8	4				3	1	1	4	13	
8	Grand Rapids Railway	162	150	75	75			3	7		2	124	38	123
9	Grand Rapids, Grand Haven and Muskegon	19	15	15				3	1			19		19
10	Grand Rapids, Holland and Lake Michigan	38	19	11	6		2	17		2		24	14	22
11	Houghton County Street Railway	30	16	16								20	10	
12	Twin City General Electric	6	4	4					10	4		5	1	
13	Negaunee and Ishpeming	13	10	4	6				1	1		10	3	
14	Jackson and Suburban Traction	23	21	12	9				2	1		21	2	16
15	Michigan Traction	64	61	29	20	12						53	11	31
16	Lansing City Electric	17	16	10	6			1		1	1	11	6	
17	Manistee, Filer City and Eastlake	34	29	10	19					1		18	16	
18	Marquette and Presque Isle	18	12	7	5			1	5			8	10	
19	Menominee Light, Railway and Power	19	18	9	9							9	10	5
20	Toledo and Monroe	14	11	7	2		2		2	1		11	3	12
21	Muskegon Traction and Lighting	58	54	26	25	3		1	2		1	19	39	
22	Detroit, Plymouth and Northville	7	6	4	2				1			6	1	6
23	Owosso and Corunna Electric	6	5	1	2		2		1			4	2	
24	Saginaw Valley Traction	74	65	34	29		2		3	6		39	35	
MINNESOTA.														
	Total for state	1,083	1,026	717	309				32	21	4	814	269	794
1	Interstate Traction	8	8	4	4							5	3	8
2	Duluth-Superior Traction	126	115	114	1				8	1	2	110	16	119
3	Twin City Rapid Transit	930	886	585	301				23	20	1	683	247	659
4	Benton Power and Traction	8	8	7	1							7	1	
5	Winona Railway and Light	11	9	7	2				1		1	9	2	8
MISSISSIPPI.														
	Total for state	49	47	31	16				2			37	12	4
1	Greenville Light and Car	6	6	6								3	3	
2	Jackson Railway, Light and Power	11	10	6	4				1			9	2	
3	Meridian Light and Railway	10	9	7	2				1			7	3	
4	Natchez Railway and Power	4	4	4								4		4
5	Vicksburg Railroad, Power and Manufacturing	18	18	8	10							14	4	
MISSOURI.														
	Total for state	2,484	2,305	1,465	527	310	3	27	86	6	60	1,932	552	2,177
1	Citizens Street Railway	1	1		1								1	
2	Carrollton Electric Railway	4	2				2	1	1			3	1	
3	Clinton Street Railway	2	2	1	1								2	
4	Hannibal Railway and Electric	6	6	3	3							6		6
5	Southwest Missouri Electric Railway	40	36	25	11			1	3			38	2	
6	Metropolitan	845	801	443	245	113		4	14		26	399	446	805
7	Missouri Water, Light and Traction	9	9	2	7							5	4	
8	St. Joseph Railway, Light, Heat and Power	170	157	75	82			2	4	4	3	105	65	157
9	St. Louis Transit	1,179	1,090	750	153	187		12	49		28	1,175	4	1,059
10	St. Louis and Suburban	78	66	66				3	7		2	74	4	78
11	St. Louis and Meramec River	64	60	60				1	2		1	64		62
12	St. Louis and Kirkwood	10	10			10						10		10
13	St. Louis, St. Charles and Western	22	15	14			1	3	4			18	4	
14	Railway and Electric of Sedalia	18	16	6	10				2			17	1	
15	Kickapoo Transit	3	3	3									3	
16	Springfield Traction	33	31	17	14					2		18	15	
MONTANA.														
	Total for state	109	90	62	28			9	6	2	2	79	30	17
1	Anaconda Copper Mining	22	18	12	6				2	1	1	5	17	
2	Bozeman Street Railway	3	2	2				1				2	1	
3	Butte Electric Railway	49	39	24	15			8	1		1	49		
4	Great Falls Street Railway	18	16	13	3				2			10	8	
5	Helena Power and Light	17	15	11	4				1	1		13	4	17
NEBRASKA.														
	Total for state	295	282	163	118	1		1	5		7	271	24	206
1	Lincoln Traction	80	73	41	31	1		1	5		1	60	20	4
2	Nebraska City Street Railway	4	4	4									4	
3	Omaha Street Railway	208	202	115	87						6	208		202
4	Metropolitan Cable Railway	3	3	3								3		

1 Horses rented.

GENERAL TABLES.

315

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—							Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.		
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.			
1,735	183	11	959	186	772	1,658	1,657	1	76	56	38	107	10,406	508		
7			5	2	3	7	7			1			5		1	
47			18	18		43	43			2	4	20	2,000		2	
30			10	10		30	30			2	1	3	25		3	
920	58		546	4	542	910	910		22	15	8		1,800	150	4	
97	31		47		47	71	70	1	6	5	4		500	100	5	
37	26		29	6	23	37	37		11	4			100	78	6	
17			9	8	1	13	13		1	1	1		150		7	
162		11	75	17	58	160	160		3	3	6	40	3,000		8	
19	19		15	15		19	19		8	1		3	500	45	9	
38	13		16		16	23	23		7	1			300	44	10	
30	12		16	16		20	20		7	2	2		150	14	11	
5			4	4		5	5			1			100		12	
11			4		4	10	10		4	1			100		13	
23	2		12		12	23	23		2	1		4	16	11	14	
57	7		40	33	7	64	64		2	3	3	2	200	32	15	
17			10		10	17	17		1	1	1		20		16	
34			10	10		29	29		1	1		15	90		17	
12			6	5	1	12	12			1			55		18	
19			9		9	18	18			1	3		105		19	
14	9		7	2	5	11	11			1			15	25	20	
58			29	29		56	56		2	1		10	400		21	
6			2	2		6	6			1			250		22	
6			3	3		5	5			1	2		25		23	
69	6		36	2	34	69	69		2	5	3	10	500	9	24	
1,083	58	3	599	2	597	1,078	1,078		6	13	26	174	2,492	18		
8			4		4	8	8			1			12		1	
126			115	1	114	122	122		3	2	8	50	800		2	
930	58	3	467	1	466	930	930		3	9	17	123	2,050	18	3	
8			7		7	8	8						30		4	
11			6		6	10	10			1	1	1	100		5	
49			10	8	2	48	48		2	5	4	7	242			
6			2		2	6	6			1			20		1	
11						11	11		2	1	1	3	20		2	
10						9	9			1		2	52		3	
4						4	4			1			20		4	
18			8	8		18	18			1	3	2	150		5	
2,395	100	309	1,589	580	1,069	2,356	1,918	438	34	56	139	39	11,825	170		
1						1		1		1	(1)				1	
3			2		2	3	3		1	1			6		2	
2											(1)				3	
6			3	3		6	6			1			25		4	
40			22	22		38	38		4	3			500	31	5	
845	86	132	443	326	118	839	405	434	12	13	20	17	750		6	
9			2		2	9	9			1			20		7	
170			60	60		157	157			3	2	19	275		8	
1,093	13	171	900		900	1,095	1,095		4	23	100		7,500	18	9	
78	1	6	66	60	6	66	66		1	1			1,394	46	10	
64			60	60		63	63		6	1			330	35	11	
10			10		10	10	10			1			70	27	12	
20			15		15	18	18		6	3			350	13	13	
18			6		6	17	17			2		1	30		14	
3						3		3		1	15				15	
33						31	31			1	2	2	75		16	
107	7	47	60	60		94	86	8	1	7	2	34	390	1		
22	7		12	12		13	13			2		8	25		1	
3			2	2		2	2			1	1		10		2	
49		47	22	22		48	40	8		2	1	10	75		3	
16			13	13		16	16		1	1		1	30	1	4	
17			11	11		15	15			1		15	250		5	
295		16	165		165	295	281	4	1	8	30	11	725			
80			43		43	76	76			8	4	1	300		1	
4			4		4	4		4			14				2	
208		16	115		115	202	202			4		10	400		3	
8			8		8	8			1	1	12		25		4	

STREET AND ELECTRIC RAILWAYS.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscellaneous.	Snow-plow.	Sweep-er.	Electric equipment.		With fenders.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Passenger and ex-press.							
NEW HAMPSHIRE.														
	Total for state.....	287	244	96	146	1	1	2	16	22	3	234	53	209
1	Concord Street Railway.....	133	29	12	17				2	2		27	6	
2	Chester and Derry.....	11	10	5	4		1			1		11		
3	Exeter, Hampton and Amesbury.....	99	78	31	46	1		2	10	9		89	10	80
4	Keene Electric Railway.....	11	9	4	5					2		11		11
5	Laconia Street Railway.....	11	9	3	6				1	1		11		9
6	Manchester Street Railway.....	99	88	31	57				2	6	3	63	36	88
7	Portsmouth Electric Railway.....	23	21	10	11				1	1		22	1	21
NEW JERSEY.														
	Total for state.....	2,165	1,942	1,083	832	22	5	9	94	45	75	1,956	210	1,891
1	West Jersey and Seashore.....	84	80	17	60		3		3		1	65	19	61
2	Bridgeton and Millville.....	28	24	12	11		1		2	1	1	21	7	
3	Brigantine Transportation.....	10	8		6	2						7	3	
4	Camden, Gloucester and Woodbury.....	64	60	13	47				2		2	64		64
5	Camden and Suburban.....	124	114	70	36	8			5	1	4	122	2	120
6	Cape May, Delaware Bay and Sewells Point.....	14	11		10	1			3			11	3	
7	Elizabeth, Plainfield and Central Jersey.....	90	83	41	42	1			4		3	90		83
8	New Jersey and Hudson River Railway and Ferry.....	24	21	11	10				2	1		20	4	21
9	Jersey City, Hoboken and Paterson.....	446	415	255	159		1	2	7	4	18	409	37	428
10	North Jersey Street Railway.....	880	771	509	282				42	30	37	830	50	801
11	Jersey Central Traction.....	4	4	2	2							4		
12	Monmouth County Electric.....	19	16	6	9	1			2		1	17	2	17
13	Atlantic Coast Electric Railroad.....	83	75	9	62	4		5		1		73	10	73
14	Millville Traction.....	16	13	6	7				2	1		10	6	
15	Mt. Holly Street Railway.....	3	3	3								3		
16	Middlesex and Somerset.....	57	52	26	26				1	3	1	44	13	40
17	Ocean City Electric Railroad.....	8	8	1	7							8		
18	Orange and Passaic Valley.....	41	35	18	17				3	1	2	40	1	36
19	South Orange and Maplewood.....	9	5	4	1			1	2		1	6	3	5
20	Raritan Traction.....	22	20	9	10	1			1	1		22		17
21	Point Pleasant Traction, Electric Light and Power.....	5	5		5							5		
22	Newark and Hackensack.....	14	12	10	2				2			13	1	13
23	Trenton Street Railway.....	95	89	48	41				1	1	4	56	39	89
24	Camden and Trenton.....	18	13	10		3			5			14	4	13
25	Trenton, Lawrenceville and Princeton.....	15	3	3				1	1			4	1	
26	Orange Mountain Traction.....	2	2			2							2	
NEW MEXICO.														
	Total for territory.....	8	8	6	2								8	2
1	Albuquerque Street Railroad.....	8	8	6	2								8	2
NEW YORK.														
	Total for state.....	14,040	12,978	7,888	4,626	448	16	181	452	241	188	10,222	3,818	7,123
1	Albany and Hudson Railway and Power.....	*54	34	26	5		3	18		2		34	20	29
2	United Traction.....	396	356	200	156			6	15	12	7	396		377
3	Hudson Valley Railway.....	140	103	36	67			24	7	6		109	31	7
4	Troy and New England.....	26	17	8	9			8		1		10	16	5
5	Amsterdam Street Railroad.....	24	22	8	14					1	1	20	4	18
6	Auburn City Railway.....	23	22	11	11						1	21	2	20
7	Auburn Interurban Electric.....	6	4	4				1		1		6		4
8	Ballston Terminal Railroad.....	11	2	1			1	7	2			2	9	
9	Binghamton Railway.....	112	81	42	39			2	26	2	1	67	45	64
10	International Railway.....	670	567	308	259			3	52	45	3	519	151	463
11	Croton Street Railway.....	251	251	221	30							251		251
12	Buffalo and Depew.....	8	6	5					3			6	3	5
13	Buffalo, Hamburg and Aurora.....	11	7	5	2			2	2			5	6	7
14	Ontario Light and Traction.....	7	7	2	5							3	4	
15	Catskill Electric Railway.....	10	10	4	6							7	3	7
16	Cohoes City Railway.....	17	14	8	6				1	1	1	17		14
17	Cortland County Traction.....	21	18	5	13			1		2		13	8	
18	Corning and Painted Post.....	12	11	5	6				1	1		11	1	10
19	Dunkirk and Fredonia.....	23	19	8	11			3			1	8	15	19
20	Dunkirk and Point Gratiot.....	12	12	3	9							12		8
21	Elmira Water, Light and Railroad.....	78	74	37	37				1	2	1	71	7	62
22	Ocean Electric Railway.....	5	5		5							2	3	2
23	Citizens Street Railway.....	18	17	7	10					1		13	5	17
24	Fonda, Johnstown and Gloversville.....	29	23	16	7			1	5			27	2	27
25	Lake Ontario and Riverside.....	3	3									3		
26	Geneva, Waterloo, etc., Traction.....	35	32	16	15		1		1	1	1	27	8	
27	Mountain Lake Electric.....	5	5		4	1						5		
28	Bennington and Hoosick Valley.....	19	15	7	8			2	1	1		17	2	16
29	Hornellsville Electric Railway.....	13	11	6		5			2			6	7	6
30	Hornellsville and Canisteo.....	7	5	2	1	2		1		1		3	4	3
31	Huntington Railroad.....	12	9	5	4			1	2			5	7	
32	Ithaca Street Railway.....	30	29	12	17					1		27	3	
33	Jamestown Street Railway.....	56	51	27	24			1	2		2	50	6	
34	Kingston Consolidated.....	40	38	14	24				1	1		40		
35	Lewiston and Youngstown Frontier.....	9	7	2	5			2				9		9
36	Lima-Honeoye Light and Railroad.....	5	2	2				1	1	1		2	3	
37	Middletown-Goshen Electric.....	24	20	9	11			1	2	1		18	6	17
38	New York and Long Island Traction.....	5	4	4					1			4	1	

* Exclusive of 1 steam motor

GENERAL TABLES.

317

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.	Number.
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.		
287	89		96	92	3	266	266		17	14	12	83	847	127	
33			11	8	3	29	29		3	1	4	18	250	10	1
11			5	5		10	10		2	1		15	15	8	2
99	39		31	31		89	89		3	6		15	196	75	3
11			4	4		11	11		1	1			75		4
11			3	3		9	9		1	1			50		5
99	40		31	31		96	96		3	3	8	45	157	18	6
23	10		10	10		22	22		8	1		5	105	16	7
2,154	49	308	1,067	655	432	2,099	2,094	5	22	64	87	191	11,782	247	
84	1		20	20		84	84		4	1	1	2	540	9	1
28	3	2	13	13		26	26		2	2			100	31	2
10						8	8			2	1		100	7	3
64			13	13		64	64		1	2	1		225	9	4
124		5	65		65	124	124		3	3	9	25	2,570	30	5
14			1			11	11		4	2			100		6
90			41		41	86	86		2	4	2		298		7
24	2	15	11	11		24	24			1			155		8
446		43	256	156	100	417	417			9	20	25	2,020		9
880	17	223	509	309	200	880	880			17	89	45	3,169	150	10
4			2		2	4	4			1			50		11
19			6	6		17	17		2	1			175		12
81	5		13	13		83	83			1			675		13
16			6	1	5	13	13			2		90	100		14
3						3		3		1	2	3			15
57	12		26	26		57	57		1	4	1		235		16
8			1	1		8	8			2			65		17
40		20	18	3	15	39	39		1	1	2		115		18
7	1		4	4		6	6		1	1			50		19
20			10	10		20	20			1	2		75	1	20
5						5	5			1		1	50		21
14			10	10		12	12		1	1			45		22
95	5		48	48		89	89			2	7		800		23
14			11	11		13	13		1	2			15	10	24
5	3		3		3	4	4		3				30		25
2						2		2	1				25		26
8						8		8	1	1	14				
8						8		8	1	1	14				1
13,806	2,070	1,160	8,734	5,868	2,866	12,932	10,391	2,541	565	177	5,760	901	40,346	534	
54	28		20	17	3	40	36	4	27	2		19	805	40	1
396	11	178	200	200		396	396		6	5	28	42	707	15	2
140	7		44	26	18	124	124		4	3	4		1,200	137	3
26		5	8	8		19	19			1			200	9	4
22		6	8	8		20	20			1		3	15		5
22			11	11		23	23			1	3		100		6
6	2		4	4		6	6		2						7
11			2		1	2	2		6	1			50	8	8
112	8		38	38		112	112		2	2	8	3	500		9
463	200	75	311	311		495	495		32	10	39	59	3,716		10
251	25	8	221	221		251	251		2	3	2	5	260		11
8	5		5	5		5	5			1			50		12
11		5	5	5		7	7			1			50		13
7			2	2		7	7			1	1		15		14
10			4		4	10	10			1			25		15
17			8	8		17	17			1			12		16
21		14	6	6		21	21		1	1	1		100		17
12			5	5		12	12			1			30		18
23			12	2	10	19	19		3				60		19
12						12	12		1	1			20		20
78	1		37	16	21	78	78		1	2		11	41		21
2						2	2						15		22
18			7		7	18	18			1			30		23
29	4		14	14		27	27			1		1	155	10	24
3			3		3	3		3		1	6				25
35			12	10	2	33	33		2	1		10	350		26
5			1	1		5	5			1			50		27
19			7	7		17	17			2			50	10	28
13			6	6		11	11		1	1			40		29
7			4	4		5	5								30
12			2	2		9	9		2			5	100	6	31
30			12	12		29	29		1	2	1		100		32
56			27	27		56	56		3	2	3		300		33
40			14	14		38	38		2	2	2	12	1,000		34
9			3	3		8	8		6	1			110	8	35
4			2	2		2	2		2	1			15	5	36
24			9	9		22	22		9	2		3	150		37
5	4		4	4		4	4			1			25	9	38

* Exclusive of 1 steam locomotive.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscel-lane-ous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Pas-senger and ex-press.							
NEW YORK—Continued.														
39	Orange County Traction.....	40	31	14	17			2	5	1	1	24	16	30
40	New Paltz and Poughkeepsie.....	9	5	2	3			1	2		1	7	2	
41	Interurban.....	3,063	2,903	1,805	958	140		15	46	27	72	2,181	882	1,200
42	Central Crostown.....	117	113	83	30					2	2		117	
43	Fulton Street Railroad.....	9	9	9									9	
44	Thirty-fourth Street Crostown.....	52	50	50						1	1	50	2	50
45	Twenty-eighth and Twenty-ninth Street Cross-town.....	14	14	14									14	
46	Third Avenue Railroad.....	600	582	320	190	72				6	12	600		582
47	Forty-second Street, Manhattanville and St. Nicholas Avenue.....	128	118	100	18					5	5		128	
48	Dry Dock, East Broadway and Battery.....	203	189	171	18				2	4	8		203	
49	Kingsbridge Railway.....	4	4	4								4		4
50	Southern Boulevard Railroad.....	(1)												
51	Yonkers Railroad.....	80	75	34	41				4		1	80		60
52	Union Railway.....	462	450	249	201			1	1	5	6	462		
53	Tarrytown, White Plains and Mamaroneck.....	24	13	4	9			1	7	2	1	24		
54	Westchester Electric Railroad.....	(1)												
55	Manhattan Railway (elevated).....	*1,331	1,290	1,268	22				41			151	1,180	
56	Pelham Park Railroad.....	11	9	9					2				11	
57	City Island Railroad.....	(1)												
58	Brooklyn Rapid Transit.....	*3,504	3,285	1,681	1,383	221		17	120	43	39	2,941	563	2,412
59	Coney Island and Brooklyn.....	561	566	286	280			1	8	2	4	557	24	557
60	Van Brunt Street and Erie Basin.....	15	15	7	8							15		15
61	New York and Queens County.....	274	253	126	127			6	6	7	2	244	30	
62	New York and North Shore.....	39	35	10	25				3		1	38	1	
63	Staten Island Midland.....	70	65	20	45			1	3	1		70		65
64	Staten Island Electric.....	109	103	33	70				1	2	3	109		103
65	Niagara Gorge Railroad.....	32	29	3	26				3			23	9	32
66	Northport Traction.....	3	2			2		1				3		
67	Ogdensburg Street Railway.....	17	16	4	7	5					1	16	1	
68	Olean, Rock City and Bradford.....	13	8	3	5			3	1	1		9	4	
69	Olean Street Railway.....	21	18	12	6				2	1		19	2	
70	Oneida Railway.....	2	2										2	
71	Oneonta, Cooperstown and Richfield Springs.....	29	14	6	6		2	14		1		16	13	
72	Westchester Traction.....	9	9	7	2							7	2	
73	Oswego Traction.....	26	23	10	13				1	1	1	25	1	13
74	Peekskill Lighting and Railroad.....	18	16	6	10				1	1	1	18		16
75	Penn Yan, Keuka Park and Branchport.....	8	6	2	4			1	1			7	1	
76	Plattsburg Traction.....	11	10	4	6					1		11		
77	New York and Stamford.....	35	32	12	20				1	2		35		
78	Port Jervis Electric, Gas and Railroad.....	6	6	3	3					1		3	3	
79	Poughkeepsie and Wappingers Falls.....	25	23	14	9						1	25		
80	Rochester Railway.....	228	196	147	48		1	5	9	15	3	186	42	176
81	Rochester and Suburban.....	18	18	6	12							14	4	14
82	Rochester and Sodus Bay.....	39	19	6	5		8	7	11	2		26	13	37
83	Rochester, Charlotte and Manitou.....	18	16		16				2			6	12	
84	Rome City.....	11	10	5	5					1			11	
85	Schenectady Railway.....	90	61	43	18			10	15	4		75	15	75
86	Sea Cliff Incline Cable.....	2	2	2									2	
87	Southfield Beach Railroad.....	(1)												
88	Syracuse Rapid Transit.....	147	134	88	46				1	11	1	106	41	94
89	Syracuse and Suburban.....	15	11	9	2			2	1	1		14	1	13
90	Syracuse, Lakeside and Baldwinsville.....	20	17	8	9			1		2		20		17
91	Utica and Mohawk Valley.....	160	138	77	61			2	17	1	2	102	58	96
92	Black River Traction.....	28	21	11	10				6		1	24	4	
93	Elmira and Seneca Lake.....	9	8	6	2				1			8	1	
94	Buffalo, Gardenville and Ebenezer.....	10	10	3	7							4	6	
95	Hamburg Railway.....	15	9	8	1			3	1	2		12	3	
96	Buffalo and Williamsville.....	9	5	3	2			3		1		9		
NORTH CAROLINA.														
Total for state.....		131	99	48	48	2	1	25	7			84	47	10
1	Asheville Electric.....	7	6	2	2	2		1				7		
2	Asheville Street Railroad.....	28	26	12	14			1				24	4	
3	Asheville and Craggy Mountain.....	*30	9	2	6		1	19	1	2		2	28	
4	Charlotte Railway, Light and Power.....	22	20	12	8				2			21	1	
5	Raleigh Electric.....	10	10	5	5							8	2	
6	Consolidated Railways, Light and Power.....	13	12	6	6				1			9	4	
7	Fries Manufacturing and Power.....	21	16	9	7			4	1			13	8	10
OHIO.														
Total for state.....		4,395	3,975	2,277	1,594	34	70	44	275	47	54	3,188	1,207	2,987
1	Ashtabula Rapid Transit.....	19	17	9	8				1	1		19		17
2	Pennsylvania and Ohio.....	15	13	6	3	2	2		1	1	1	13	2	13
3	Ohio Central Traction.....	16	11	4	7				4	1		6	10	4
4	Consolidated.....	6	6	2	4							4	2	
5	Stark Electric.....	11	11	9			2					11		6
6	Canton-Akron.....	73	66	35	26		5	2	3	2		63	10	42
7	Chillicothe Electric Railroad, Light and Power.....	10	8	4	4				1	1		9	1	
8	Cincinnati Traction.....	1,105	1,063	545	518			2	28		12	702	403	690
9	Price Hill Incline Plane.....	4	2	2				2					4	
10	Mill Creek Valley.....	53	50	38	12				3			53		46
11	Cincinnati, Dayton and Toledo.....	78	52	41	9		2	2	19			49	24	45
12	Cincinnati, Lawrenceburg and Aurora.....	13	12	12					1			13		13

* Cars rented.

* Exclusive of 292 steam locomotives.

GENERAL TABLES.

319

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.	
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.		
40			14	14		40	40		5	2			150	11	39
9	2		4	2	2	9	9		3	2			30	9	40
3,063			1,963	1,431	552	2,750	1,868	882		15	3,676	150	5,000		41
117			83		83	115		115		2	534		150		42
9			9		9	9		9			44				43
52			50	50		50	50								44
14			14		14	14		14			232				45
600			392	392		582	582			3	26	30	800		46
128			100		100	118		118		4	89	30	1,000		47
203			171		171	201		201		3	842	15	100		48
4			4	4		4	4								49
80			34	34		75	75		3	1	1		300		50
462			249	249		456	456		4	3	13	50	500		51
24			4	4		14	14			1			250		52
1,331	1,331		1,268	332	936	1,290	354	936	3	2	3	15	250		53
11			9		9	9		9	199	4		200	8,000	23	54
3,504	286	847	2,215	1,381	834	3,198	2,966	212	151	17	(*)	150	9,000		55
581			291	291		576	576			7	82	20	350		56
15			7	7		15	15			2			30		57
274			126	126		261	261		2	3	12		1,000		58
39			10	10		36	36		3	1			250		59
70			20	20		67	67			1	2		100		60
109			33	33		103	103		1	2	3	3	54		61
32	29		3	3		29	29			1			10		62
3			2	2		3	3		1				30		63
17			9	9		16	16			1			20		64
13	6		4	4		11	11		11	2			65		65
21			12	12		19	19			1	3		50		66
2			2		2	2		2		1	8				67
29	17		8	6	2	16	16		8	1			150		68
9			7		7	9	9						50		69
26			9	9		22	22		2	2	1		25		70
18			6	6		17	17			1			25		71
8			2	2		7	7		4	1			50		72
11			4	4		10	10		1	1			50		73
35	3		12	12		35	35		1	2			135		74
6			3	3		6	6			1			30		75
25			23	23		25	25			1	4				76
228	1		166	115	51	219	196	24	1	3	21	12	600		77
18	14		3	2	1	18	18		2	2		4	12		78
37			28	28		37	37		24	3			80		79
18						18	18		1	1			50		80
7	3		5		5	10		10	1	1			40		81
90	25		43	43		90	90		1	1	1	39	20		82
									2						83
147	14		88	88		134	134			1			20		84
13			10	10		12	12		1	1	9		500		85
17	6	12	8	8		17	17		1	1	2		73		86
160	31		77	58	19	138	136	2	2	5	10	5	40		87
24			12	12		22	22			1			211		88
9	4		6	6		8	8		1	1			180		89
10			3	3		10	10			1		5	50		90
11	4		5	8		9	9		5	1			35		91
9			3	3		6	6			1			60		92
													20		93
130	16	1	48	48		100	100		9	8	3	9	460		94
7		1	4	4		7	7		1	1	3		150		95
28			12	12		28	28		1	1			60		96
30	15					2	2		2	1			41		97
22			12	12		21	21			1		1	85		98
10	1		5	5		10	10			1		2	40		99
12			6	6		12	12		1	1			34		100
21			9	9		20	20		4	2		6	50		101
															102
4,330	445	147	2,421	1,381	1,040	4,100	4,100		248	138	187	470	17,207	1,257	103
17			9	9		17	17			1			50		104
15	7		14	13	1	14	14		2	3			100		105
16			4	4		12	12		3	1			50		106
6			2	2		6	6			1			50		107
11	6		11		11	11	11		2	1	28	4	82		108
73	8		35	27	8	70	70		2	3	2	10	300		109
10			4	4		9	9			1	1		25		110
1,105	50		545	495	50	1,063	1,063			11	60	112	550		111
			2	2		2	2		2	2		10	50		112
53	46		50	46	4	50	50		4	2	2	5	250		113
80	1	22	44	44		44	44		16	4		35	1,615	144	114
13		13	12	12		12	12		2	1			200	23	115

* Telegraph lines.

* Horses rented.

* Exclusive of 121 steam locomotives.

* Exclusive of 1 electric engine and 1 steam locomotive.

STREET AND ELECTRIC RAILWAYS.

TABLE 95.—CARS AND MISCELLANEOUS

Number.		STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
			Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscel-laneous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
				Total.	Closed.	Open.	Combination.						With.	With-out.	
							Closed and open.	Pas-senger and ex-press.							
OHIO—Continued.															
13	Cleveland Electric Railway	647	584	366	218				46	4	13	523	124	631	
14	Cleveland City Railway	294	285	227	58				2		7	287	7	295	
15	Cleveland, Elyria and Western	39	27	21		6			9	2	1	30	9	33	
16	Eastern Ohio Traction	36	25	20		5	4		2	5		36		31	
17	Cleveland, Painesville and Eastern	31	29	22	2	6			1		1	31		29	
18	Northern Ohio Traction	128	115	56	56	3			10		3	64	64	59	
19	Columbus Railway	314	275	152	123		1	33	5			232	82	267	
20	Columbus, London and Springfield	10	10	10								10		10	
21	Columbus, Buckeye Lake and Newark	17	14	5	5	4	1	1	1			15	2	15	
22	City Railway	155	152	62	90					3		103	52	100	
23	Peoples Railway	116	114	51	63				1		1	42	74	40	
24	Oakwood Street	24	24		24							20	4	20	
25	Dayton and Western	10	6	4		2	2	1	1			8	2	8	
26	Dayton and Northern	11	8	8			1	2				9	2	9	
27	Dayton, Springfield and Urbana	21	18	14	4		2		1			21		20	
28	Dayton and Troy	29	19	4	6	1	2	8				18	11	15	
29	Dayton and Xenia	21	18	10	5	3			2			16	5	16	
30	Peoples Gas and Electric	5	4	2	2				1			2	3	2	
31	Delaware Electric Railway	13	13	7	6							13		13	
32	United Electric	5	5	3	1	1						5			
33	East Liverpool Railway	31	28	18	10		1	2				31		5	
34	Lancaster Traction	14	12	7	5			1			1	12	2		
35	Lima Railway and Light	28	27	15	12						1	24	4	23	
36	Western Ohio Railway	25	19	16		3	4	2	2			25		19	
37	Lorain Street Railway	25	14	14			1	9	1			20	5	17	
38	Mansfield Railway, Light and Power	32	30	14	13	3	1		1			27	5	31	
39	Marion Street Railway	11	10	7	3				1			10	1		
40	Mt. Vernon Electric Railway	11	11	2	9							4	7		
41	Newark and Granville	20	17	7	10		1	2				11	9		
42	Tuscarawas Traction	25	22	15	6	1		3				20	5		
43	Ohio River Railway and Power	11	11	3	6	2						11			
44	Portsmouth Street Railroad	21	19	11	8			1	1			11	10		
45	Salem Electric Railway	6	6	4	2							6			
46	Springfield Railway	51	49	36	13			1		1		41	10	36	
47	Springfield and Xenia	8	5	3		2	1	2				6	2	6	
48	Steubenville and Pleasant Heights	6	6	2	4							6			
49	Steubenville Traction and Light	25	24	11	12	1					1	25			
50	Electric Railway and Power	14	13	3	10				2	1		8	6		
51	Tiffin, Fostoria and Eastern	16	13	6	4	1	2		2	1		13	3		
52	Toledo Railways and Light	306	283	132	151				8	8	7	155	151	132	
53	Toledo, Bowling Green and Southern	39	32	26	6		3	3	3		1	39		32	
54	Toledo, Fostoria and Findlay	10	9	4	3		2		1			8	2	6	
55	Toledo and Western	54	15	9	3		3	34	1	1		19	35	15	
56	Lake Shore	81	62	54	5	3	3	15		1		61	20	40	
57	Toledo and Maumee Valley	19	16	8	8		1	2				19		17	
58	Wellston and Jackson Belt	10	10	10								5	5	10	
59	Worthington, Clintonville and Columbus	5	4	4				1				5			
60	Youngstown Park and Falls	21	20	6	14			1				11	10	7	
61	Youngstown-Sharon Railway and Light	47	43	23	16	4	1	2	1			34	13	20	
62	Mahoning Valley	66	56	40	14	2	3	4	1	2		61	5	59	
63	Zanesville Electric Railway	33	33	16	17							33		33	
OREGON.															
Total for state		279	250	150	77	23		5	19	1	4	200	79	16	
1	Astoria Electric	5	5	4	1							5			
2	Portland Railway	108	95	39	37	19		2	4		2	67	36		
3	City and Suburban	118	105	78	24	3			11			97	21		
4	Portland City and Oregon	31	26	16	10			2	2	1		16	15	16	
5	Salem Light, Power and Traction	20	18	12	5	1			2			15	5		
6	Union Street and Suburban	12	1	1				1					2		
PENNSYLVANIA.															
Total for state		7,058	6,420	3,302	2,746	346	26	51	285	147	155	6,450	608	5,693	
1	Lehigh Valley Traction	187	168	118	50				7	10	2	124	63	145	
2	Philadelphia and Lehigh Valley	36	32	22	8	2			2	2		31	5	19	
3	Allentown and Kutztown Traction	31	26	4	19	3		1	3	1		25	6	25	
4	Altoona and Logan Valley	77	73	40	33				1	1	2	55	22	73	
5	Bangor and East Bangor	1	1	1								1		1	
6	Beaver Valley Traction	41	33	25	13			1	1		1	37	4	39	
7	Riverview Electric Street Railway	3	3	1	2							3		3	
8	Patterson Heights Street Railway	1	1	1								1			
9	Columbia and Montour	13	12	8	4				1			10	3		
10	Bradford Electric Street Railway	15	14	6	8					1		12	3	14	
11	Butler Passenger Railway	12	11	5	3	3			1			12			
12	Carlisle and Mt. Holly	13	10	3	7				3			8	5		
13	Cumberland Valley Traction	14	12	6	6				2			8	6	1	
14	Chester Traction	84	76	36	40				4	1	3	84		76	
15	Media, Middletown, Aston and Chester	21	17	13	4				3	1		19	2	4	
16	Philadelphia and Chester Railway	(^c)													
17	Connellsville Suburban	7	7	4	3							7			
18	Newtown Electric Street Railway	17	14	11	3				3			14	3	14	
19	Doylestown and Easton	6	6	6								6			
20	Doylestown and Willow Grove	13	12	7	5				1			11	2		
21	Dubois Traction	8	8	4	4							7	1		
22	Easton and Nazareth	14	12	8	4				1	1		12	2	12	

¹ Exclusive of 1 steam locomotive.

GENERAL TABLES.

321

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Miles of exclusive telephone lines.	Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.				
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.			
647		13	368	2	366	628	628		5	9	16	100	2,960	17	13	
294			227		227	285	285		7	7	25	6	600		14	
33	33		33	33		33	33		9	3			300	62	15	
31	31		25	9	16	31	31		6	2			1,000	90	16	
31		31	27	27		30	30		3	3		10	240	38	17	
128	1	17	59	27	32	128	128		2	4		2	500	85	18	
307	6	1	152	152		285	285		5	5	4		1,700		19	
10	10		10	10		10	10		17	1			50	65	20	
17	14		9	9		17	17		6	2		18	350	41	21	
152			62	62		152	152			3	3	5	240		22	
116			51	51		115	115			3	3	20	200		23	
24			24	24		24	24			1	3		150		24	
10	8		8	8		8	8		5	1		2	150	25	25	
9	9		9	9		9	9		14	1			410	41	26	
21	8	9	16	16		21	21		10	1			107	42	27	
25	15		15	10	5	22	22		8	3		6	350	32	28	
21	9		11	11		20	20		16	2			400	50	29	
4			2	2		4	4		1	1			40		30	
13			7	7		13	13		3	1			100	2	31	
5			4	3	1	5	5			1			50		32	
31		8	18	17	1	28	28			2		8	75		33	
14			7	7		12	12			2			50		34	
28			15	15		28	28		1	1	1		50	1	35	
25	21		20	9	11	21	21		4	1		18	78	79	36	
21	14		19	14	5	25	25		1	3		10	120	10	37	
32			17	6	11	32	32		2	1			125	12	38	
11			7		7	10	10			1			15		39	
11			2	2		11	11		1	1	1	10	200		40	
20			7		7	20	20			2	2		50		41	
25			15	14	1	15	15		2	2			75		42	
11			5	5		11	11		1	1			60	2	43	
21			11	9	2	20	20		1	3	1		100		44	
6			4		4	6	6		1	1			6		45	
51			37	37		50	50		1	2	3	3	200	2	46	
8	6		5	5		6	6		9	1			150	19	47	
6			2	2		6	6			1					48	
25	7		12	11	1	25	25		1	2	2	4	100	10	49	
14			8		8	13	13			1			20		50	
16		2	6	3	3	14	14		2	3			85	15	51	
306			132		132	283	283			3	21	40	1,000		52	
39	14		26	14	12	32	32		2	2	5		100	30	53	
9	9		6	6		9	9			1		12	175	16	54	
54	54		15		15	15	15		17	1			54	56	55	
81	25	12	63	22	41	66	66		20	4		8	175	134	56	
17	1		8		8	19	19		4	1			55		57	
10	10		10	10		10	10		24	2					58	
5			4		4	4	4			1			20		59	
20			6		6	20	20						85		60	
47	4	24	27	27		47	47		5	4		12	255	31	61	
66	18		40		40	59	59		5	2	2		450	24	62	
33			16	16		33	33		1	1	2		60		63	
277	9	9	25	23	2	253	237	16	14	11	14	1	1,120	39		
5						5	5		1	1			100		1	
108	1	9	7	7		95	81	14	1	3		1	80		2	
118						107	107		5	4			650	20	3	
31	6		17	16	1	27	26	1	1	1	14		200	16	4	
18						18	18		5	2			90		5	
2	2		1		1	1	1	1	1					3	6	
6,972	1,064	532	2,299	1,226	1,073	6,886	6,860	26	145	173	286	631	13,110	245		
185	60		119	27	92	185	185			3	4	82	1,846		1	
36	15		24	3	21	36	36		2	4	2	11	260		2	
27			7	1	6	27	27		1	1		50	400	4	3	
73	12		40	40		77	77		2	2	3	20	200		4	
1			1		1	1	1								5	
39		8	25	25		39	39			1			200		6	
3		2	1		1	3	3			1					7	
1						1	1		2	1			6		8	
13			8	8		12	12		2	1			30		9	
15			7	7		15	15			1			5		10	
12	2		8	8		11	11			1			40		11	
13	2		3	3		10	10			1					12	
14			6		6	12	12			1			35		13	
84	34		37	36	1	83	83		4	2	4	15	70	2	14	
20			13	13		18	18		3	2			506	11	15	
7			4		4	7	7			1			13		16	
17	1		11		11	14	14		1	2			45		17	
6	2		6	6		6	6			1			10		18	
11	2		5	5		13	13			1			100	12	19	
8			3	3		8	8								20	
13	2	2	8	8		12	12			1			1,100	9	21	

* Cars rented.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscel-lane-ous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Pas-senger and ex-press.							
PENNSYLVANIA—Continued.														
23	Erie Electric Motor	84	81	30	51						1	84		81
24	Erie Traction	22	7	5		2		1	13	1		10	12	
25	Erie Rapid Transit	12	6	6				1	4	1		8	4	
26	Franklin Electric Street Railway	8	8	3	5							8		
27	Gettysburg Transit	7	6		6				1			6	1	
28	Hanover and McSherrystown	5	4	2	2					1		3	2	3
29	Lehigh Traction	46	39	20	19			1	3	2	1	34	12	
30	Harrisburg Traction	116	106	67	39				6	2	2	113	3	109
31	Harrisburg and Mechanicsburg	11	11	9	2							11		11
32	Cambria Incline Plane	2	2			2							2	
33	Johnstown Passenger Railway	74	70	50	20				2	2		62	12	62
34	Kittanning and Ford City	7	7	5	2							7		4
35	Conestoga Traction	84	66	33	22	6	5		15	2	1	75	9	72
36	Lebanon Valley	22	20	12	8				1			21	1	
37	Lewistown and Reedsville	9	8	8					1		1	8	1	8
38	Susquehanna Traction	10	8	5	3				1	1		6	4	6
39	Lykens and Williams Valley	8	7	3	4				1			8		8
40	Highland Grove	2	2	2								2		2
41	Schuylkill Traction	37	28	15	10		8		8		1	31	6	28
42	Mauch Chunk, Lehigh and Slatington	20	16	4	6	6			3	1		17	3	8
43	Meadville Traction	14	11	8	3				1	1	1	14		14
44	Lewisburg, Milton and Watsonstown	9	8	4	4					1		8	1	6
45	Montoursville Passenger	8	7	3	4				1			6	2	6
46	New Castle Traction	52	50	17	33				1		1	30	22	50
47	New Castle and Lowell	10	10	10								10		10
48	Schuylkill Valley Traction	89	80	44	36				3	2	4	89		29
49	Lansdale and Norristown	4	4	4								4		
50	Peoples Street Railway	10	8	4	4				1	1		8	2	
51	Citizens Traction	13	12	4	8				1			13		
52	Oil City Street Railway	20	18	6	12				2			20		
53	Union Traction	3,283	2,982	1,429	1,237	816		41	96	85	79	3,277	6	3,119
54	Southwestern Street Railway	26	24	8	16				1		1	26		25
55	Philadelphia, Bristol and Trenton	10	8	4	4				2			7	3	
56	Philadelphia and West Chester Traction	26	20	11	9				3	2	1	25	1	
57	Holmesburg, Tacony and Frankford	43	40	18	27					1	2	36	7	40
58	Fairmount Park Transportation	74	69	19	50				4	1		31	43	
59	Delaware County and Philadelphia	21	18	12	6				2		1	20	1	8
60	Montgomery and Chester	7	7	4	3				1			8		8
61	Pittsburg Railways	1,252	1,189	673	516			2	21	8	32	1,074	178	1,189
62	St. Clair Incline Plane	2	2			2								
63	Duquesne Incline Plane	2	2	2										
64	Pittsburg and Castle Shannon	2	2			2								
65	Monongahela Incline Plane	4	2	2				2						
66	Penn Incline Plane	2	2			2								
67	Pittsburg, McKeesport and Greensburg	18	18	11	7							18		
68	Pittsburg, McKeesport and Connellsville	79	69	35	34				7		3	79		12
69	Pottstown Passenger Railway	16	16	9	7							13	3	
70	Ringling Rocks Electric	18	11	2	9				2			9	4	
71	Pottsville Union Traction	62	53	24	23	2	4		7	1	1	50	12	
72	Punxsutawney Street Railway	8	8	7	1							8		
73	United Traction	118	110	61	49					4	4	98	25	110
74	Waverly, Sayre and Athens	15	13	8	5				1		1	14	1	
75	Neversink Mountain Railroad	8	8	5	3							8		8
76	Mt. Penn Gravity Railway	10	9	1	8						1	8	7	
77	Scranton Railway	188	126	88	38				9		3	112	26	135
78	Shamokin and Mt. Carmel	22	20	10	10				1	1		22		
79	Shamokin and Edgewood	16	13	6	5	2			3			10	6	
80	Stroudsburg Passenger	5	4	2	2					1		7	3	2
81	Sunbury and Northumberland	10	7	4	3				2	1		7	3	
82	Tamaqua and Lansford	18	17	7	8	2					1	15	3	16
83	Tarentum Traction Passenger	7	7	4	3							7		7
84	Titusville Electric Traction	15	13	4	7	2		1	1			11	4	
85	Warren Street Railway	20	16	9	6	1			3	1		18	2	15
86	Washington Electric Railway	12	12	7	5							12		
87	West Chester Street Railway	11	7	4	2	1			4			5	6	
88	Wilkesbarre and Wyoming Valley	150	140	65	75				6	2	2	150		
89	Wilkesbarre, Dallas and Harveys Lake	19	14	2	11		1		3	1	1	12	7	
90	Vallamont Traction	5	5	2	3							5		5
91	South Side Passenger Railway	2	2	1	1							2		2
92	Williamsport Passenger Railway	27	24	14	10				1	2		16	11	24
93	East End Passenger Railway	2	2	2								2		2
94	Red Lion and Windsor	1	1			1						1		1
95	Yardley, Morrisville and Trenton	5	5	3	2							3	2	
96	York and Dover Electric	1	1			1						1		1
97	York and Dallastown Electric	1	1			1						1		1
98	York Street Railway	40	38	16	22				1		1	34	6	34
RHODE ISLAND.														
Total for state		820	708	371	322		15	21	40	51		762	58	665
1	Sea View Railroad	13	11	4	6		1		2			12	1	
2	Pawtucket Street Railway	53	46	28	18				3	4		51	2	47
3	Union Railroad	501	429	224	195			6	31	35		498	8	455
4	Rhode Island Suburban	126	118	48	66		4			8		126		118
5	Providence and Danielson	30	16	8	6		2	13		1		14	16	13
6	New York, New Haven and Hartford	46	43	36			7	2	1			22	24	22
7	Pawcatuck Valley Railway	9	8	1	6		1		1			8	1	8
8	Woonsocket Street Railway	42	37	12	25				2	3		36	6	2

1 Not reported.

GENERAL TABLES.

323

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Miles of exclusive telephone lines.	Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.				
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.			
81			30		30	81	81		1	2	4		200		28	
22	10		5	1	4	7	7		4	1			50		24	
12		6	6	6		8	8			1			60		25	
7			3	3		3	3						30		26	
4			2		2	6	6			1			25		27	
46			21	1	20	43	43	1		1			5		28	
116	16		73	64	9	113	113		5	2		5	50		29	
11	4		9		9	11	11			5		10	190		30	
										1			15		31	
60	8		50		50	72	72	2	2			3	50		32	
7			5	5		7	7		3	3	1	7	60		33	
84			44	10	34	75	75		6	1			125		34	
22			13	7	6	21	21			1	3	2	15		35	
8	2		8	8		8	8			1			107		36	
9			5	3	2	8	8		1				60		37	
8			4		4	8	8						20		38	
2			2	2		2	2			1					39	
28		3	18	17	1	28	28			1			120		40	
17	6		10	10		17	17			3	1		195		41	
14			11	11		11	11		1	1		6	40		42	
8			4	4		8	8			2		4	100		43	
8			2	2		7	7		1	1		10	10		44	
50		28	17	17		50	50		1	1	2	58	675		45	
10	10		10		10	10	10		2	1			100	10	46	
89	19	6	40	40		84	84			5	5		500	12	47	
4	4		4	4		4	4			1			80		48	
10			4	4		8	8		2	1			30		49	
8	4		4	4		12	12		3	1			20		50	
20			6	6		18	18		1	2		2	50		51	
3,283	713		363	363		3,283	3,283		15	22	155			65	52	
26			8	8		24	24			1	7	(1)	(1)		53	
10			4		4	8	8			1			50		54	
26	16		11	11		26	26		10	2		20	100		55	
40			40		40	43	43			1	3		100	23	56	
73		70	9	9		71	71		18	1		15	400		57	
21			10	10		20	20			1			100	5	58	
8			4	4		8	8			1			100	1	59	
1,252	2	367	673	103	570	1,252	1,252			22	69	220	1,000		60	
			2		2	2	2	2	2				15		61	
			2		2	2	2	2	2				30		62	
			2		2	2	2	2	2			8	12		63	
			2		2	2	2	2	2						64	
			2		2	2	2	2	2						65	
18			11		11	18	18			1					66	
79	25	14	35	35		79	79			3	5		180		67	
16			9	1	8	16	16			3			30		68	
13			2		2	12	12			1		24	150	3	69	
62			30	30		53	53		2	1		1	200		70	
8	2		3	3		8	8		3	2			40		71	
118	16		61	47	14	110	110			8	4	7	203		72	
15			8	8		13	13			1			75		73	
8						8	8			1			5		74	
9	9		1		1	9	9	9		1			40	3	75	
138	15	1	88	63	25	138	138			1			765		76	
22			10	1	9	20	20			3	5	15	100		77	
13			4	4		13	13		1	2	1	4	300		78	
4			2		2	4	2	2		1			5		79	
7			4		4	7	7			1			40		80	
17	14	3	8	8		18	18			1		4	500		81	
7			4		4	14	14		1	1					82	
15			4	4		14	14		3	1		5	50		83	
20	2		10	4	6	18	18		4	2	3		150		84	
12		12	7	7		12	12			1			20		85	
9			5		5	12	12	2	2	2			17		86	
150	28		65	65		144	144			4	2	20	550		87	
18	4	10	13	13		16	16		4	1			60	13	88	
5			2		2	5	5			1			10		89	
2			1		1	2	2								90	
27			14		14	14	14			2		1	30		91	
2			2		2	2	2			1			5		92	
1	1		1	1		1	1			1					93	
5			3		3	5	5								94	
1	1		1	1		1	1								95	
1	1		1	1		1	1								96	
40			16		16	40	40		1	3	1	2	30		97	
763	123	10	390	390		788	788		40	24	39	111	5,065	25	98	
13	5		4	4		12	12		5	1			80		1	
47			28	28		51	51			1	1		140		2	
460	8		235	235		492	492			12	35	15	1,910		3	
118	43		52	52		126	126			4		95	2,750		4	
30	13	10	13	13		20	20			2			150	20	5	
46	46		46	46		46	46		34	1					6	
9						8	8			1			20	5	7	
40	8		12	12		33	33			2	3	1	15		8	

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.												
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscellaneous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.
			Total.	Closed.	Open.	Combination.						With.	With-out.	
						Closed and open.	Pass-enger and ex-press.							
SOUTH CAROLINA.														
	Total for state	185	123	78	35	8	2	6	6			106	29	94
1	North Augusta Electric and Improvement	(1)												
2	Charleston Railway, Gas and Electric	76	73	51	12	8	2	1	2			60	16	74
3	Columbia Railway, Light and Power	28	26	10	16				2			28		20
4	Greenville Traction	11	10	5	5				1			11		
5	Orangeburg City Street Railway	7	2	2				5					7	
6	Rock Hill Water, Light and Railway	4	4	4									4	
7	Spartanburg Railway, Gas and Electric	9	8	6	2				1			7	2	
SOUTH DAKOTA.														
	Total for state	2	2	2									2	
1	Rapid City Street Railway	2	2	2									2	
TENNESSEE.														
	Total for state	575	555	326	222	5	2	3	14	2	1	470	105	353
1	Bristol Belt Line	10	8	5	3				2			9	1	
2	Chattanooga Electric Railway	66	63	48	15			1	2			62	4	
3	Rapid Transit of Chattanooga	35	31	25	4		2		4			30	5	
4	Electric Railway of Clarksville	6	6	3	3							4	2	
5	Jackson and Suburban	11	10	5	5				1			5	6	2
6	Knoxville Traction	59	56	26	30				2	1		50	9	
7	Memphis Street Railway	215	212	132	80			1	1		1	184	31	182
8	Nashville Railway	178	169	82	82	5		1	2	1		126	47	169
TEXAS.														
	Total for state	474	449	230	203	11	5	4	21			366	108	95
1	Austin Electric Railway	14	13	13					1			13	1	
2	Bonham Electric Railway, Light and Power	5	5	3	2							2		2
3	Dallas Consolidated	65	65	34	31							55	10	
4	Rapid Transit	32	31	9	22				1			23	9	
5	Denison and Sherman	17	16	6	7		3		1			9	8	14
6	El Paso Electric Railway	22	20		14	6			2			14	8	
7	Northern Texas Traction	61	60	47	11		2	1				50	11	10
8	Galveston Street Railway	69	62	31	31				7			63	6	62
9	Houston Electric	66	61	28	29	4			5			48	18	
10	Laredo Electric and Railway	7	6	2	4				1			6	1	
11	Longview and Junction	2	2	1	1								2	
12	Paris Transit	7	6	5	1				1			5	2	7
13	San Antonio Traction	69	69	25	44							58	11	
14	Seguin Street Railway	5	2	2				3					5	
15	Citizens Railway	22	21	18	3				1			20	2	
16	Waxahachie Street Railway	6	5	3	2				1				6	
17	Lake Park Street Railroad	5	5	3	1	1							5	
UTAH.														
	Total for state	158	149	95	52	2			6	2	1	132	26	2
1	Ogden Rapid Transit	22	18	16	2				3	1		12	10	
2	Consolidated Railway and Power	134	129	77	50	2			3	1	1	118	16	
3	Salt Lake and Utah Valley	2	2	2								2		2
VERMONT.														
	Total for state	105	80	31	41	2	6	7	8	8	2	90	15	78
1	Barre and Montpelier	14	12	6	6						2	13	1	12
2	Bellows Falls and Saxtons River	10	6	1	3	2		2	1	1		7	3	6
3	Brattleboro Street Railway	10	8	4	4				1	1		8	2	7
4	Burlington Traction	20	18	8	10					2		20		18
5	Rutland Street Railway	14	13	6	7				1	1		14		14
6	St. Albans Street Railway	12	9	2	6		1	3				8	4	10
7	Springfield Electric Railway	12	5	1	2		2		6		1	8	4	6
8	Mt. Mansfield Electric Railway	6	3				3	2			1	5	1	
9	Military Post Railway	7	6	3	3						1	7		6
VIRGINIA.														
	Total for state	681	626	356	256	6	8	25	25	1	4	461	220	497
1	Charlottesville City and Suburban	10	10	4	6							7	3	7
2	Danville Railway and Electric	23	23	9	14							10	13	10
3	Washington, Arlington and Falls Church	25	19	11	8			6				15	10	
4	Lynchburg Traction and Light	30	30	15	15							28	2	
5	Citizens Railway, Light and Power	12	12	8	4							8	4	8
6	Newport News and Old Point Railway and Electric	60	51	24	27			3	5		1	35	25	35
7	Bay Shore Terminal	8	7	4	3				1			5	3	4
8	Norfolk and Atlantic Terminal	24	22	6	8	6	2	2				13	11	14
9	Berkley Street Railway	16	16	13	3							16		16
10	Norfolk Railway and Light	83	67	44	23			13	2		1	61	22	61
11	Southside Railway and Development	38	37	15	22				1			16	22	29

¹ Cars rented.

GENERAL TABLES.

325

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—						Number.
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.	
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.		
133	26		19	19		127	121	6	6	7	17	18	1,725	7	
74	4		13	13		73	73			2	3	12	275	7	
28	22					28	28			1	3	1	1,200	2	
11						11	11			1				3	
7						2		2		1	6			4	
4						4		4		1	4			5	
9			6	6		9	9		3	1	1	5	250	6	
														7	
2			2		2	2		2			3				
2			2		2	2		2			3			1	
563	14	14	124	119	5	529	529		27	16	22	48	905	10	
10			5	2	8	9	9		2	1			25	1	
62	4		40	40		63	63		1	3		5	250	2	
29			27	27		29	29		20	2		10	100	3	
6						6	6		1	1			15	4	
10			2		2	10	10			1	1		145	5	
58			26	26		57	57		1	2	4	10	100	6	
215	10	9				214	214		1	1	15	19	150	7	
173		5	24	24		141	141		1	5	2	4	120	8	
470	17		37	27	10	456	442	14	7	24	58	52	1,867	44	
14						13	13			1	2	5	40	1	
5			2	2		5	5			1				2	
65						65	65			1	8		50	3	
32			9		9	32	32			4			50	4	
17	5		5	5		16	16		1	1		10	600	5	
22	2					20	20			1		3	65	6	
61	10		15	15		61	61		4	4	3	12	220	7	
69						66	66			2	4	10	100	8	
62						62	62			1	2	4	400	9	
7						6	6		1	1			24	10	
2			1		1	2		2		1	6			11	
7			5	5		6	6			1	1	5	125	12	
69						69	69			1	6	3	150	13	
5						2		2		1	5			14	
22						21	21		1	1	4		40	15	
6						5		5		1	17		3	16	
5						5		5		1				17	
											(*)				
158	6		89	35	54	151	151			4	10	2	80		
22			10	10		18	18			1			50	1	
134	6		77	25	52	131	131			2	10	2	25	2	
2			2		2	2	2			1			5	3	
95	16		47	34	13	88	88		8	12	8	15	520	44	
12			6	6		12	12			1	1		35	14	
10			4	3	1	7	7		1	1			125	2	
10			4	4		9	9			2			45	3	
20			8	8		18	18			1	2		15	4	
12	2		6		6	13	13		1	2	5		25	5	
12	11		4	3	1	10	10			1		15	200	13	
6	3		4	3	1	8	8			2			40	7	
6			8	4	4	5	5		3	1			30	10	
7			3	3		6	6		1	1			5	9	
678	65	6	267	265	2	640	638	2	52	24	42	77	1,666	62	
10			4	4		10	10		1	1	1		50	1	
23			9	9		23	23			1			150	2	
25			8	8		19	19		15	2			55	3	
30		2	15	15		30	30			2	1		42	4	
12			8	8		12	12		1	1		4	120	5	
60			16	16		56	56			1		2	35	6	
22	15	4	3	3		7	7			1			105	7	
16			12	12		22	22		3	1		6	150	8	
83	14		6	6		16	16		3	1			100	9	
37			15	15		72	72		8	2	4	22	400	10	
						87	87			1				11	

*This company failed to make a report; the information given was obtained from street-railway journals and directories.

* Not reported.

TABLE 95.—CARS AND MISCELLANEOUS

Number.	STATE AND NAME OF COMPANY.	NUMBER OF CARS.													
		Aggregate.	Passenger.					Ex-press, freight, and mail.	Work and miscel-lane-ous.	Snow-plow.	Sweep-er.	Electric equipment.		With fend-ers.	
			Total.	Closed.	Open.	Combination.						With.	With-out.		
						Closed and open.	Pass-enger and ex-press.								
VIRGINIA—Continued.															
12	Richmond and Petersburg Electric.....	9	8	6			2			1			8	1	8
13	Old Dominion Railway.....	21	19	13			2			2			11	10	19
14	Norfolk, Portsmouth and Newport News.....	23	21	14						2			21	2	21
15	Radford Water Power.....	3	3										3		
16	Richmond Traction.....	100	98	58			45			1			74	26	100
17	Richmond Passenger and Power.....	96	94	48			46				1		71	24	96
18	Virginia Passenger and Power.....	54	48	29			19		1	5		1	31	23	54
19	Roanoke Railway and Electric.....	13	12	10			2			1			12	1	
20	Tazewell Street Railway.....	2	2											2	
21	Washington, Alexandria and Mt. Vernon.....	32	27	25			2			4	1		16	16	16
WASHINGTON.															
Total for state.....		431	312	126	77	109		14	99	6			268	163	325
1	Everett Railway and Electric.....	7	5	5						1	1		6	1	5
2	Olympia Light and Power.....	9	4	2				2	3				6	3	6
3	Seattle Electric.....	215	181	79			66		4	27	3		136	79	189
4	Seattle and Renton.....	33	10	5			4		1	22			12	21	11
5	Washington Water Power.....	46	42	2			3			1	2		44	1	42
6	Spokane and Montrose Motor.....	5	4	4					1				4	1	4
7	Tacoma Railway and Power.....	101	52	21			5		5	44			45	56	54
8	Northern Railway and Improvement.....	16	14	8					1	1			15	1	14
WEST VIRGINIA.															
Total for state.....		287	272	126	134	11	1	3	11		1		276	11	174
1	Kanawha Valley Traction.....	11	10	6			4			1			10	1	
2	East Liverpool and Rock Springs.....	18	18	6			12						18		
3	Fairmont and Clarksburg.....	13	13	7			6						7	6	13
4	Camden Interstate Railway.....	44	38	28			10		2	4			42	2	
5	Parkersburg, Marietta and Interurban.....	49	47	23			24			2			47	2	16
6	Wheeling and Wellsburg.....	4	4	3			1						4		
7	Wheeling Traction.....	111	108	44			56			2		1	111		111
8	Wheeling and Elm Grove.....	37	34	9			21		1	2			37		34
WISCONSIN.															
Total for state.....		682	621	421	196	2	2	1	36	12	12		599	83	475
1	Wisconsin Traction, Light, Heat and Power.....	12	10	8			2			2			12		10
2	Ashland Light, Power and Street Railway.....	14	11	8			3			2	1		11	8	2
3	Chippewa Valley Electric Railroad.....	22	20	12			8			1	1		13	9	
4	Fond du Lac Street Railway and Light.....	19	18	12			6			1			13	6	
5	Fox River Electric Railway and Power.....	26	23	14			9			2	1		17	9	16
6	Janesville Street Railway.....	6	6										6		6
7	La Crosse City Railway.....	17	16	15			1				1		17		17
8	La Crosse and Onalaska.....	1	1	1									1		1
9	Madison Traction.....	33	31	16			15			1	1		29	4	31
10	Manitowoc and Northern.....	10	10	7			3						6	4	
11	Marquette Gas, Electric Light and Street Railway.....	21	21	5			16						9	12	
12	Merrill Railway and Lighting.....	4	3	3							1		3	1	
13	Milwaukee Electric Railway and Light.....	396	357	257			98	2		24	4	11	396		351
14	Milwaukee Light, Heat and Traction.....	28	28	25			3						20	8	20
15	Winnebago Traction.....	42	39	21			18			1	1	1	27	15	21
16	Sheboygan Light, Power and Railway.....	22	20	10			8		1		1		16	6	
17	Waupaca Electric Light and Railway.....	9	7	1			6			2			3	6	
HAWAII.															
Total for territory.....		81	79	18	53	8		2					39	42	35
1	Hawaiian Tramways.....	32	32	16			16							32	
2	Honolulu Rapid Transit and Land.....	45	45	2			35	8					35	10	35
3	Pacific Heights Electric Railway.....	4	2				2		2				4		
PORTO RICO.															
Total.....		34	26	17	9			1	7				13	21	13
1	Tramway Stock.....	16	14	5	9				2					16	
2	San Juan Light and Transit.....	18	12	12					1	5			13	5	13

¹ Not reported.

GENERAL TABLES.

327

EQUIPMENT, BY COMPANIES: 1902—Continued.

NUMBER OF CARS—continued.									NUMBER OF—					
With brakes.			Heated.			Lighted.			Stations.	Car houses.	Horses.	Lamps for buildings, shops, car houses, etc.		Miles of exclusive telephone lines.
Hand.	Air.	Other mechanical.	Total.	Electric.	Stove, etc.	Total.	Electric.	Oil, gas, etc.				Arc.	Incandescent.	
9	8		8	8		8	8		5	1			55	22
21	2		2	2		19	19			1			60	13
23	3					21	21			1			75	14
3						3	3			1			20	15
100			58	58		100	100			2	4	16		16
95	2		48	48		95	95			2	20	15	23	17
54			29	29		49	49				10	4	28	18
13			4	4		12	12		1	1		8	98	19
2			2		2			2			2			20
32	21		25	25		27	27		15	1			100	13
429	41	130	52	49	3	336	265	71	63	16	33	63	1,608	63
7						6	5	1	2	1	4	16	240	1
9		1				5	5		2	1			40	3
215	41	66				193	135	58	22	4	22	7	520	60
33		11	3	3		12	12		17	2			40	4
45		40	42	42		45	45			1	6	11	66	5
5			4	4		4	4			1			6	6
101		12	3		3	57	45	12	20	5	1	17	600	7
14						14	14			1		12	96	8
286	17	20	149	136	13	281	281		4	18	5	27	1,060	32
10			6	6		10	10		1	1			34	1
18		6	6	2	4	18	18			1		1	36	2
13			7	7		13	13			2			200	3
44	10	4	39	30	9	41	41			5	3	4	105	18
49	4	4	23	23		47	47			2		4	210	14
4			4	4		4	4			1			50	5
111	2		51	51		111	111			2	2	18	225	7
37	1	6	13	13		37	37		3	4			200	8
679	24	2	428	47	381	631	629	2	15	22	70	93	4,181	317
12	6		8		8	12	12		2	1	1		180	12
14			8		8	11	11			1	2		30	2
22	2		12	12		20	20			1	1		50	3
18			12		12	18	18			1	1		121	14
24			16	1	15	24	24			1	1	2	90	4
6			5	3	2	6	6			1	1		60	5
17			15		15	16	16			1	1		70	6
1			1		1	1	1			1	4			7
33			17		17	33	33			2	4		40	8
10		2	10	2	3	10	10			1	2		20	9
21			5	2	3	21	21			1	3		75	10
21			3	3		3	3			1	3		48	11
396	10		257		257	357	357		2	5	49	1	2,858	12
28			25		25	28	28			2		87	189	13
42			21	15	6	42	42			1	1		185	14
22	6		12	8	4	22	20	2		1	3	3	185	15
9			1	1		7	7		6	1			50	16
81						79	47	32	2	1	7		250	17
32						32		32						2
45						45	2		1	1	(1) 7			1
4						2			1				250	2
29		11				27	13	14	1	3	49	2	171	9
16						14		14		1				1
13		11				13	13		1	2	47	2	171	2

STREET AND ELECTRIC RAILWAYS.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
	UNITED STATES.....	806	2,336	1,298,133	1,589	421,051	430	297,257	317	579,825	* 51,228	301	10,074	3,853	893,205	
	ALABAMA.															
	Total for state	6	33	12,345	25	6,495	6	3,450	2	2,400		2	5	47	9,535	
1	Anniston Electric and Gas	1	2	400	2	400						2	5	2	225	
2	Birmingham Railway, Light and Power	1	15	8,220	9	3,420	4	2,400	2	2,400				28	6,150	
3	Decatur Street Railway															
4	Alabama City, Gadsden and Attalla	1	3	425	3	425								4	450	
5	Huntsville Railway, Light and Power	1	2	300	2	300								3	360	
6	Mobile Light and Railroad	2	11	3,000	9	1,950	2	1,050						10	2,350	
7	Montgomery Street Railway		(^b)													
8	Selma Street and Suburban ^c															
9	Tuscaloosa Belt Railway															
	ARIZONA.															
	Total for territory	1	1	250	1	250								3	300	
1	Phoenix Railway	1	1	250	1	250								3	300	
2	Tucson Street Railway															
	ARKANSAS.															
	Total for state	5	11	2,365	11	2,365								16	3,155	
1	Citizens Electric	1	1	165	1	165								2	180	
2	Fort Smith Traction	1	3	400	3	400								3	375	
3	Fort Smith and Van Buren	1	1	150	1	150								1	150	
4	Hot Springs Street Railroad ^c															
5	Little Rock Traction and Electric	1	2	900	2	900								6	1,850	
6	Citizens Light and Transit	1	4	750	4	750								4	600	
7	Texarkana Railway															
	CALIFORNIA.															
	Total for state	33	71	31,415	46	10,850	19	13,115	6	7,450	10 6,820	30	302	152	30,276	
1	Bakersfield and Kern Electric ^c															
2	Fresno, Belmont and Yosemite															
3	Fresno Railroad															
4	Nevada County Traction	1	(^b)													
5	Los Angeles Electric Incline ^c															
6	Los Angeles Railway	1	5	4,050	1	250	2	1,150	2	2,650				10	2,500	
7	Los Angeles and Pasadena	1	5	1,350	4	700	1	650			45			4	700	
8	Los Angeles Pacific Railway	2	4	1,650	8	1,050	1	600				1	15	6	1,650	
9	Pacific Electric Railway ^c	1	2	275	2	275								2	300	
10	Los Angeles Traction	1	3	1,000	3	1,000								4	1,000	
11	Marysville and Yuba City															
12	Monrovia Street Railway															
13	Monterey and Pacific Grove															
14	Oakland Transit Consolidated	3	10	2,750	10	2,750								10	2,500	
15	Ontario and San Antonio Heights	1									200					
16	Pasadena and Mt. Lowe ^c	1									12 100					
17	Paso Robles Street Car															
18	Petaluma Street Railway															
19	Pomona Street Railway															
20	Redlands Street Railway ^c															
21	Riverside and Arlington ^c															
22	Sacramento Electric, Gas and Railway	1	1	565			1	565			6,250			2	700	
23	San Bernardino Valley ^c	1														
24	San Diego Electric Railway	1	2	500	2	500								3	321	
25	Geary Street, Park and Ocean	1	2	500	2	500						3	25	5	750	
26	California Street Cable	1	1	600			1	600				6	75	4	500	
27	Presidio and Ferries	1	2	400	2	400						8	50	3	300	
28	United Railroads of San Francisco	10	30	17,050	13	2,700	13	9,550	4	4,800		8	92	94	18,605	
29	San Jose Railroad ^c	1	14 2	325	2	325						14 2	20	14 2	200	
30	San Jose and Santa Clara	2	14 2	400	2	400					14 75	14 2	25	14 3	250	
31	Santa Barbara Consolidated ^c	1														
32	Santa Cruz Electric ^c	1									14 150					
33	East Santa Cruz															
34	Santa Rosa Street Railway															
35	Stockton Electric		(^b)													
	COLORADO.															
	Total for state	11	32	9,710	28	6,410	3	2,100	1	1,200	250	2	75	54	8,845	
1	Boulder Railway and Utility	1	4	385	4	385								4	400	
2	Colorado Springs and Cripple Creek	2	1	380	1	380					250			3	300	
3	Colorado Springs Rapid Transit	1	3	600	3	600								5	600	
4	Denver, Lakewood and Golden ^c															
5	Denver City Tramway	6	19	4,745	18	4,145	1	600						33	5,330	
6	Durango Railway and Realty ^c															
7	Grand Junction (municipal)															
8	Pueblo Traction and Lighting	1	5	3,600	2	900	2	1,500	1	1,200		2	75	9	2,215	

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ Includes 1 electric motor of 150 horsepower and 15 gas engines of 1,925 horsepower.⁴ For 6 companies only.⁵ Steam power rented.⁶ Power rented.⁷ For 5 companies only, and includes 2 companies operating part of year.⁸ For 9 months only.⁹ For 9½ months only.

GENERAL TABLES.

329

PLANTS, BY COMPANIES: 1902.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ²		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
2,861	972,314	2,324	422,924	328	218,934	209	330,456	441	231,924	See p. 397.....	See p. 401.....	2,261,484,397	6,249,910	3,018,320,717	8,338,190		
54	10,775	49	5,625	2	1,025	3	4,125	11	1,737	See p. 397.....	See p. 401.....	*15,600,556	42,714	*20,845,880	57,112		
2	500	2	500							See p. 397.....	See p. 401.....	216,445	593	258,715	791	No....	
29	6,492	26	2,367			3	4,125	4	712			8,233,396	22,530	11,023,365	30,201	Yes....	
4	425	4	425					1	75			803,000	2,200	1,070,545	2,933	No....	
3	458	3	458					2	140			690,215	1,891	920,165	2,521	Yes....	
10	2,400	8	1,375	2	1,025			4	810	See p. 397.....		4,489,500	12,300	5,966,000	16,400	Yes....	
6	500	6	500									1,168,000	3,200	1,557,090	4,266	No....	
																No....	
																No....	
3	160	3	160									459,900	1,260	616,485	1,689		
3	160	3	160									459,900	1,260	616,485	1,689	Yes....	
																No....	
14	2,060	14	2,060					3	466	See p. 397.....		*4,578,675	13,506	*6,104,992	18,012		
2	210	2	210									*601,702	2,198	*802,361	2,931	Yes....	
4	400	4	400									674,702	1,848	899,603	2,464	Yes....	
1	150	1	150									29,108	79	38,811	106	No....	
5	900	5	900									2,656,105	7,277	3,541,473	9,703	Yes....	
2	400	2	400					3	466	See p. 397.....		*617,068	2,106	*822,744	2,808	Yes....	
																No....	
96	25,603	80	14,636	14	8,717	2	2,250	6	5,090	See p. 397.....	See p. 401.....	**44,676,030	122,399	**59,583,064	163,240		
																No....	
																No....	
2	400	2	400							See p. 397.....		306,505	837	407,340	1,116	No....	
6	5,500			4	3,250	2	2,250					8,741,827	23,960	11,655,769	31,933	Yes....	
6	1,370	6	1,370							See p. 397.....	See p. 401.....	2,098,509	5,749	2,813,014	7,706	Yes....	
6	1,933	6	1,933							See p. 397.....						Yes....	
3	1,200	2	533	1	667							2,956,500	8,100	3,942,000	10,800	No....	
																No....	
																No....	
10	2,900	10	2,900									9,330,164	25,562	12,440,219	34,083	Yes....	
1	100	1	100					1	90	See p. 397.....		146,000	400	194,667	534	Yes....	
																No....	
																No....	
										See p. 397.....	See p. 401.....					No....	
13	1,125	13	1,125					5	5,000	See p. 397.....	See p. 401.....	1,652,856	4,528	2,203,708	6,037	Yes....	
5	770	5	770							See p. 397.....		730,000	2,000	973,455	2,667	No....	
										See p. 397.....						No....	
121	10	1	10													No....	
121	15	1	15													No....	
32	9,167	23	4,367	9	4,800					See p. 397.....	See p. 401.....	17,634,975	48,315	23,513,300	64,420	Yes....	
123	280	3	280							See p. 397.....						No....	
3	366	3	366							See p. 397.....		*574,600	1,574	*766,133	2,099	No....	
2	227	2	227													No....	
																No....	
2	240	2	240									506,094	1,384	673,459	1,845	No....	
																No....	
37	6,720	36	6,063	1	667			6	1,691	See p. 397.....		**17,856,576	48,929	**23,812,768	65,239		
3	150	3	150					2	185			1,095,000	3,000	1,460,000	4,000	Yes....	
1	308	1	308					1	306	See p. 397.....		2,299,500	6,300	3,066,000	8,400	No....	
3	600	3	600							See p. 397.....						No....	
26	4,662	25	3,995	1	667							11,600,000	31,780	15,466,667	42,373	No....	
																No....	
4	1,000	4	1,000					3	1,200	See p. 397.....		2,865,076	7,849	3,820,101	10,466	Yes....	

¹⁰ Includes 3 gas engines of 175 horsepower and 1 electric motor of 150 horsepower.

¹¹ For 11 companies only.

¹² Gas engines.

¹³ Used for lighting purposes only.

¹⁴ Not in use during period covered by report.

¹⁵ This company also rents power.

¹⁶ Electric motor.

¹⁷ For 4 companies only.

STREET AND ELECTRIC RAILWAYS.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
CONNECTICUT.																
	Total for state	22	73	30,450	60	18,600	6	4,150	7	7,700	646	4	150	105	20,316	
1	Branford Lighting and Water	1	2	375	2	375								4	400	
2	Connecticut Railway and Lighting	6	28	10,900	26	8,500			2	2,400				31	7,250	
3	Bristol and Plainville Tramway ⁴															
4	Danbury and Bethel	1	2	675	2	675								3	875	
5	Greenwich Tramway ⁴															
6	Hartford and Springfield	2	2	1,000	2	1,000								3	841	
7	Farmington Street Railway ⁴															
8	Hartford Street Railway	1	9	3,700	8	2,400			1	1,300				8	2,400	
9	Hartford, Manchester and Rockville	1	3	1,200	3	1,200						4	150	4	900	
10	New York, New Haven and Hartford (Berlin system)	1	2	2,000					2	2,000				10	1,500	
11	Meriden, Southington and Compounce	1	2	500	2	500								3	450	
12	Meriden Electric Railroad	1	3	450	3	450								3	300	
13	Middletown Street Railway ⁴															
14	Manufacturers Railroad ⁴															
15	Fair Haven and Westville	2	11	4,550	7	1,950	4	2,600						19	2,850	
16	New London Street Railway	1	2	800	2	800								2	500	
17	Montville Street Railway	1	2	1,100	1	850	1	750						3	750	
18	Norwich Street Railway ⁴															
19	Peoples Tramway	2	1	800			1	800			646			4	600	
20	Stamford Street Railroad ⁴															
21	New York, New Haven and Hartford (New Canaan branch)		2	2,000					2	2,000				6	900	
22	Suffield Street Railway		(⁵)													
23	Torrington and Winchester	1	2	400	2	400								2	300	
DELAWARE.																
	Total for state	5	18	5,725	15	3,025	2	1,200	1	1,500		1	75	20	4,600	
1	Wilmington and New Castle	1	4	525	4	525						1	75	2	500	
2	Peoples Railway	1	5	2,100	3	900	2	1,200						4	1,500	
3	Wilmington City	3	9	3,100	8	1,600			1	1,500				14	2,600	
DISTRICT OF COLUMBIA.																
	Total for district	5	22	11,050	12	2,850	9	7,000	1	1,200		8	240	27	8,652	
1	Anacostia and Potomac River ⁴															
2	Brightwood Railway ⁵															
3	Capital Traction	2	10	5,000	5	1,000	5	4,000				5	125	11	3,392	
4	City and Suburban of Washington ⁴															
5	Columbia Railway	1	5	1,250	4	500	1	750				1	25	4	1,000	
6	Georgetown and Tennallytown ⁴															
7	Metropolitan Railroad	2	7	4,800	3	1,350	3	2,250	1	1,200		2	90	12	4,260	
8	Washington and Great Falls ⁴															
FLORIDA.																
	Total for state	4	12	2,595	12	2,595					1,400			17	2,925	
1	Fort Meade Street Railway															
2	Jacksonville Electric	1	3	850	3	850								5	1,250	
3	Key West Electric	1	4	575	4	575								5	750	
4	Palatka and Heights Street Railway															
5	Pensacola Electric Terminal	1	3	420	3	420								2	300	
6	Tampa Electric	1	2	750	2	750					1,400			5	625	
GEORGIA.																
	Total for state	12	35	23,000	20	4,800	6	4,200	9	14,000	5,470	3	45	51	13,850	
1	Athens Electric Railway	1	1	100	1	100					1,050			2	150	
2	Georgia Railway and Electric	2	10	14,500	1	500			9	14,000		3	45	20	6,650	
3	Augusta Railway and Electric	2	5	2,500	2	500	3	2,000			3,220			6	3,000	
4	Columbus Railroad	2	3	400	3	400					1,200			3	400	
5	Covington and Oxford															
6	Macon Railway and Light	2	4	1,450	3	850	1	600						5	950	
7	City Electric Railway	1	4	500	4	500								3	600	
8	Savannah Electric	2	8	3,550	6	1,950	2	1,600						12	2,100	
9	Valdosta Street Railway ⁴															
10	Washington Street Railway															
IDAHO.																
	Total for state	1									60					
1	Boise Rapid Transit	1									60					
ILLINOIS.																
	Total for state	56	179	132,255	91	24,255	37	25,600	51	82,400	13,950	43	1,889	371	91,667	
1	Alton Railway, Gas and Electric	1	2	1,050	1	350	1	700						9	900	
2	Elgin, Aurora and Southern	2	14	2,825	13	2,225	1	600						14	1,935	
3	Bloomington and Normal	1	2	1,000	1	400	1	600						2	600	

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ For 15 companies only, and includes 1 company operating part of year.⁴ Power rented.⁵ Steam power rented.⁶ For 5 months only.⁷ For 4 companies only, and includes 1 company operating part of year.⁸ Power rented for 5 months. (See note 9.)

GENERAL TABLES.

331

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ²		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
102	27,479	91	17,641	6	4,240	5	5,598	16	3,160	See p. 397.....	See p. 401.....	*54,389,973	149,342	*72,496,311	199,112	.....	.....
1	34	1	34	.....	.....	.....	.....	2	300	.....	.....	714,212	1,957	952,282	2,609	Yes	1
52	9,226	50	7,106	.....	.....	.....	.....	13	2,320	See p. 397.....	.....	13,482,530	36,938	17,953,371	49,251	Yes	2
4	500	4	500	.....	.....	.....	.....	.....	.....	.....	.....	903,870	2,476	1,205,160	3,301	No	3
2	800	2	800	.....	.....	.....	.....	.....	.....	.....	.....	919,400	2,519	1,225,866	3,356	No	4
9	3,600	8	2,400	.....	.....	1	1,200	.....	.....	.....	.....	8,309,370	22,765	11,078,966	30,353	Yes	5
3	1,100	3	1,100	.....	.....	.....	.....	.....	.....	See p. 397.....	.....	1,095,000	3,000	1,460,000	4,000	Yes	6
2	2,278	.....	.....	.....	.....	2	2,278	.....	.....	See p. 397.....	.....	1,896,540	5,196	2,528,720	6,928	No	7
2	400	2	400	.....	.....	.....	.....	.....	.....	.....	.....	441,216	1,208	588,288	1,603	No	8
3	400	3	400	.....	.....	.....	.....	.....	.....	.....	.....	956,376	2,620	1,274,945	3,493	Yes	9
3	250	3	250	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	10
12	4,833	9	2,783	3	2,100	.....	.....	.....	.....	See p. 397.....	.....	23,347,225	63,965	31,129,633	85,287	No	11
2	800	2	800	.....	.....	.....	.....	.....	.....	.....	.....	589,460	1,615	785,947	2,153	Yes	12
2	1,200	1	400	1	800	.....	.....	.....	.....	See p. 397.....	.....	372,974	1,021	497,299	1,361	Yes	13
.....	.....	.....	.....	.....	.....	.....	.....	1	540	See p. 397.....	See p. 401.....	693,500	1,900	924,667	2,533	No	14
2	1,340	.....	.....	2	1,340	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	15
1	268	1	268	.....	.....	.....	.....	.....	.....	.....	.....	*84,300	562	*112,500	749	No	16
2	450	2	450	.....	.....	.....	.....	.....	.....	.....	.....	564,000	1,600	778,667	2,133	No	17
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	18
21	4,569	20	2,569	.....	.....	1	2,000	.....	.....	See p. 397.....	.....	7,730,899	21,180	10,307,866	28,240	.....	19
2	400	2	400	.....	.....	.....	.....	.....	.....	See p. 397.....	.....	1,250,490	3,426	1,667,320	4,568	Yes	20
5	800	5	800	.....	.....	.....	.....	.....	.....	See p. 397.....	.....	2,555,000	7,000	3,406,667	9,333	No	21
14	3,369	13	1,369	.....	.....	1	2,000	.....	.....	See p. 397.....	.....	3,925,409	10,754	5,233,879	14,339	No	22
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	23
26	10,525	15	2,825	9	6,500	1	1,200	.....	.....	See p. 397.....	See p. 401.....	*23,391,015	65,160	*31,188,020	86,880	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	1
13	4,475	8	975	5	3,500	.....	.....	.....	.....	See p. 397.....	See p. 401.....	7,833,938	21,463	10,445,251	28,617	No	2
5	1,250	4	500	1	750	.....	.....	.....	.....	See p. 397.....	See p. 401.....	2,067,870	5,696	2,743,160	7,515	No	3
7	4,800	3	1,350	3	2,250	1	1,200	.....	.....	See p. 397.....	.....	*13,499,707	38,061	*17,999,609	50,748	No	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	5
11	1,700	11	1,700	.....	.....	.....	.....	11	2,313	.....	See p. 401.....	*5,184,495	15,128	*6,912,456	20,170	.....	6
6	1,044	6	1,044	.....	.....	.....	.....	2	400	.....	.....	11,748,484	5,714	11,231,108	7,618	No	1
2	256	2	256	.....	.....	.....	.....	5	413	.....	.....	175,511	481	234,015	641	Yes	2
3	400	3	400	.....	.....	.....	.....	4	1,500	.....	See p. 401.....	492,750	1,350	657,000	1,800	No	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,767,750	7,583	3,680,333	10,111	Yes	4
58	15,042	52	8,112	4	2,880	2	4,050	20	7,643	See p. 397.....	See p. 401.....	*34,233,902	93,791	*45,645,112	125,055	.....	.....
2	305	2	305	.....	.....	.....	.....	1	335	.....	.....	317,445	870	423,260	1,160	Yes	1
7	6,516	5	2,466	.....	.....	2	4,050	3	3,480	See p. 397.....	See p. 401.....	22,190,232	60,796	29,586,976	81,060	Yes	2
8	2,650	5	650	3	2,000	.....	.....	2	1,200	See p. 397.....	.....	3,830,936	10,496	5,107,913	13,995	Yes	3
7	836	7	836	.....	.....	.....	.....	7	1,055	See p. 397.....	.....	629,625	1,725	839,500	2,300	Yes	4
8	1,050	8	1,050	.....	.....	.....	.....	3	560	.....	.....	1,234,112	3,381	1,645,483	4,508	No	5
4	340	4	340	.....	.....	.....	.....	2	213	.....	.....	1,080,151	2,822	1,373,495	3,763	Yes	6
22	3,345	21	2,465	1	880	.....	.....	2	800	.....	.....	5,001,401	13,702	6,668,485	18,269	Yes	7
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	No	8
1	75	1	75	.....	.....	.....	.....	.....	.....	.....	.....	219,500	601	292,667	801	.....	9
1	75	1	75	.....	.....	.....	.....	.....	.....	.....	.....	219,500	601	292,667	801	Yes	10
181	96,458	115	22,137	34	23,825	32	52,496	11	2,750	See p. 397.....	See p. 401.....	*190,833,656	527,024	*254,508,402	702,903	.....	.....
3	1,050	2	350	1	700	.....	.....	.....	.....	.....	.....	1,095,000	3,000	1,460,000	4,000	No	1
23	2,975	22	2,425	1	550	.....	.....	.....	.....	See p. 397.....	.....	5,088,216	13,954	6,790,013	18,605	Yes	2
2	1,000	2	1,000	.....	.....	.....	.....	.....	.....	.....	.....	*930,750	5,056	*1,241,000	6,744	No	3

* Includes output of Brightwood Railway for 7 months.

¹⁰ For 4 companies only, and includes 1 company operating part of year.

¹¹ For 10 months only.

¹² For 7 companies only.

¹³ Includes 5 gas engines of 400 horsepower.

¹⁴ For 34 companies only, and includes 6 companies operating part of year.

¹⁵ For 6 months only.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
ILLINOIS—Continued.																
4	Mechanicsburg and Buffalo.....															
5	Cairo Electric Railway.....		(²)												3	300
6	Egypt Electric.....	1	2	300	2	300										
7	Centralia and Central City.....															
8	Urbana and Champaign.....	1	2	400	2	400						1	200	2	500	
9	Chicago City Railway.....	5	28	23,500	4	1,400	14	8,500	10	13,600		5	800	58	14,650	
10	Chicago Union Traction.....	10	30	28,550	11	3,250	8	7,200	11	18,100	400	27	1,015	93	17,455	
11	Chicago Consolidated Traction.....	3	12	9,150	4	1,200	1	750	7	7,200		1	25	23	6,400	
12	Calumet Electric Street Railway.....	1	5	2,100	4	1,800	1	800				1	150	8	2,000	
13	Chicago Electric Traction.....	1	4	1,100	4	1,100						1	125	4	650	
14	Chicago General Railway.....	1	2	800	2	800								3	900	
15	Chicago General Electric Railway ⁵															
16	Suburban Railroad ⁵	1	2	750	2	750								3	900	
17	Northwestern Elevated Railroad.....	2	8	17,700					8	17,700		2	50	28	11,440	
18	South Side Elevated Railroad.....	1	6	9,900					6	9,900				12	4,800	
19	Metropolitan West Side Elevated.....	1	7	13,500					7	13,500				26	13,000	
20	South Chicago City Railway.....	1	4	1,600	3	900	1	700						3	900	
21	Chicago and Milwaukee.....	3	2	1,800			1	600	1	1,200		1	10	4	800	
22	Lake Street Elevated Railroad ⁵	1														
23	Chicago and Joliet ⁵															
24	Northern Electric Railway.....	1	1	100	1	100								1	100	
25	Danville Railway and Light.....	1	10	3,300	9	2,100			1	1,200		2	10	11	3,300	
26	Danville, Paxton and Northern ⁵															
27	Decatur Traction and Electric.....	1	2	700	2	700								2	700	
28	East St. Louis Railway.....	1	2	1,200			2	1,200						8	1,250	
29	St. Louis and Belleville ⁵															
30	East St. Louis and Suburban.....	2	3	2,000			3	2,000						10	1,500	
31	St. Louis and East St. Louis ⁵															
32	Granite City and St. Louis.....	1	2	1,100	1	350	1	750						3	520	
33	Freeport Electric.....	1	1	200	1	200						2	4	1	175	
34	Galesburg Electric Motor.....	1	3	550	3	550								3	255	
35	Chicago, Harvard and Geneva Lake.....	1	2	500	2	500								2	500	
36	Jacksonville Railway ⁵															
37	Kankakee Electric Railway.....	1	1	100	1	100								2	150	
38	North Kankakee Light and Railway ⁵															
39	Lincoln Street Car.....	1	1	150	1	150								1	100	
40	Coal Belt Electric Railway.....	1	2	700	2	700								3	375	
41	Murphysboro Street Railway.....															
42	Ottawa Railway, Light and Power.....	1	8	775	3	775				550				2	500	
43	Peoria and Prospect Heights ⁵															
44	Central Railway.....	1	5	1,600	5	1,600								11	1,600	
45	Peoria and Pekin Terminal.....	1	3	1,080	3	1,080								3	750	
46	Quincy Horse Railway.....	1	2	1,200			2	1,200						5	750	
47	Rockford Railway, Light and Power ⁵															
48	Rockford and Belvidere ⁵															
49	Springfield Consolidated.....	1	2	725	2	725								6	800	
50	Peoples Light and Railway.....	1	2	250	2	250								2	212	
INDIANA.																
Total for state.....		25	58	25,580	43	10,880	10	6,850	5	8,850		7	225	88	22,690	
1	Brownstown and Ewing.....															
2	John S. Crump.....	1	1	125	1	125								2	160	
3	Evansville Electric Railway.....	1	3	750	3	750								3	750	
4	Fort Wayne Traction.....	1	4	1,325	3	525	1	800						6	1,000	
5	Fort Wayne and Southwestern.....	1	1	800			1	800						2	1,000	
6	Hammond, Whiting and East Chicago ⁵															
7	Indianapolis Street Railway.....	2	7	5,350	2	500	3	2,000	2	2,850				12	4,400	
8	Broad Ripple Traction ⁵															
9	Indianapolis, Shelbyville and South-eastern.....	2	1	800			1	800				1	15	2	1,200	
10	Indianapolis and Eastern.....	1	2	1,200			2	1,200						3	1,650	
11	Union Traction.....	1	4	6,100	1	100			3	6,000		2	20	8	3,200	
12	Indianapolis, Greenwood and Franklin.....	1	2	750	2	750								3	450	
13	Jeffersonville City Railway.....															
14	Kokomo Railway and Light.....	1	1	700			1	700						2	500	
15	Lafayette Street Railway.....	1	2	800	1	250	1	550						3	750	
16	Logansport Railway.....	1	2	250	2	250								2	250	
17	Logansport, Rochester and Northern.....	1	1	150	1	150								2	160	
18	Madison Light and Railway.....	1	4	725	4	725								3	600	
19	Lake Cities.....	1	1	200	1	200								1	200	
20	Highland Railroad ⁵															
21	New Albany Street Railroad ⁵															
22	Richmond Street and Interurban.....	1	2	1,000	2	1,000								2	750	
23	Indiana Railway.....	3	5	1,700	5	1,700						1	150	12	1,450	
24	Terre Haute Electric.....	2	11	2,880	11	2,880						3	40	16	3,410	
25	Vincennes Citizens.....	1	2	205	2	205								2	180	
26	Wabash River Traction.....	1	2	770	2	770								2	630	
27	Washington Street Railway ⁵															
IOWA.																
Total for state.....		18	64	20,040	56	12,240	6	4,400	2	3,400		1	35	98	16,755	
1	Boone Electric.....	1	3	500	3	500								3	400	
2	Burlington Railway and Light.....	1	2	1,600			2	1,600						8	1,600	
3	Cedar Rapids and Marion City.....	1	3	600	3	600								3	300	
4	Peoples Street Railway.....															

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ Steam power rented.⁴ Gas engines.⁵ Power rented.⁶ Owned, but not operated.

GENERAL TABLES.

333

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
2	160	2	160					2	150			876,000	2,400	1,168,000	3,200	No.	4
2	180	2	180									1,478,250	4,060	1,971,000	5,400	No.	5
4	560	4	560									503,700	1,380	671,600	1,840	No.	6
16	13,066			10	6,660	6	6,396			See p. 397.		30,282,590	82,966	40,376,786	110,621	No.	7
11	15,860			5	4,280	3	11,600			See p. 397.		35,322,686	96,774	47,096,915	129,065	No.	8
12	7,230	5	1,750	4	2,480	3	3,000			See p. 397.		20,827,934	57,063	27,770,579	76,084	No.	9
5	2,100	4	1,300	1	800			1	150	See p. 397.		2,575,335	7,065	3,452,191	9,457	No.	10
4	675	4	675							See p. 397.		1,134,344	3,109	1,512,458	4,142	No.	11
2	800	2	800									2,007,500	5,500	2,676,545	7,333	No.	12
62	750	2	750													No.	13
8	15,000					8	15,000			See p. 397.		16,425,000	45,000	21,900,000	60,000	No.	14
6	6,200			4	3,200	2	3,000			See p. 397.		21,528,998	58,983	28,705,828	78,644	No.	15
7	13,500					2	13,500			See p. 397.		25,354,495	69,464	33,805,993	92,619	No.	16
4	1,600	3	900	1	700					See p. 397.	See p. 401.	3,098,960	8,490	4,154,222	11,380	No.	17
2	900	1	300	1	600			2	750	See p. 397.	See p. 401.	2,565,585	7,029	3,444,505	9,437	No.	18
1	550			1	550							109,500	300	146,000	400	No.	19
17	2,350	17	2,350					3	1,100		See p. 401.	920,000	2,521	1,226,667	3,361	No.	20
2	600	2	600									460,995	1,263	614,660	1,684	No.	21
2	1,000	2	1,000									3,285,000	9,000	4,380,000	12,000	No.	22
8	2,000			3	2,000							6,570,000	18,000	8,760,000	24,000	No.	23
2	950	1	275	1	675							292,800	1,600	390,400	2,133	No.	24
2	200	2	200									419,750	1,150	559,667	1,538	No.	25
3	550	3	550													No.	26
2	500	2	500									150,562	412	200,750	550	No.	27
62	260	2	260													No.	28
1	150	1	150									*153,000	510	*204,000	680	No.	29
1	300	1	300									*61,500	500	*81,918	666	No.	30
1	150	1	150									*675,250	2,228	*900,335	2,971	No.	31
2	470	2	470							See p. 397.						No.	32
5	290	5	290					2	400			1,350,500	3,700	1,800,910	4,934	No.	33
5	1,600	5	1,600							See p. 397.		328,500	900	438,000	1,200	No.	34
2	900	2	900					1	200	See p. 397.		1,204,500	3,300	1,606,000	4,400	No.	35
6	1,100	5	450	1	650							1,149,750	3,150	1,533,000	4,200	No.	36
11	225	1	225													No.	37
4	495	4	495									2,430,900	6,660	3,241,200	8,880	No.	38
2	222	2	222									*170,820	555	*227,760	740	No.	39
61	14,000	53	8,503	6	3,444	2	2,063	13	8,965	See p. 398.	See p. 401.	1048,737,302	140,640	1065,088,917	187,858	No.	40
1	120	1	120									182,312	363	175,416	483	No.	41
3	750	3	750							See p. 398.		1,815,000	5,000	2,420,000	6,667	No.	42
4	1,025	3	450	1	575			1	1,000	See p. 398.	See p. 401.	2,427,250	6,650	3,236,455	8,867	No.	43
												1,478,880	2,624	1,638,506	3,499	No.	44
9	4,062	5	890	2	1,119	2	2,063			See p. 398.		13,048,750	35,750	17,398,455	47,667	No.	45
								1	700	See p. 398.	See p. 401.	11,489,256	5,318	11,652,341	7,129	No.	46
2	1,200			2	1,200					See p. 398.	See p. 401.	1,651,615	4,525	2,219,200	6,080	No.	47
2	600	2	600					3	6,000	See p. 398.	See p. 401.	13,219,925	36,219	17,700,000	48,600	No.	48
												985,500	2,700	1,320,570	3,618	No.	49
2	419	2	419									328,500	900	440,390	1,206	No.	50
8	1,176	7	625	1	550							1,023,825	2,805	1,372,400	3,750	No.	1
2	160	2	160									*439,200	3,600	*565,600	4,800	No.	2
1	150	1	150									*109,800	600	*146,400	800	No.	3
3	293	3	293					2	230			515,880	1,412	687,173	1,883	No.	4
1	100	1	100									365,000	100	486,666	133	No.	5
																No.	6
4	1,072	4	1,072							See p. 398.	See p. 401.	3,536,950	9,690	4,715,800	12,920	No.	7
7	1,290	7	1,290					1	125	See p. 398.		3,793,875	10,394	5,058,500	13,859	No.	8
8	710	8	710					5	900			2,058,534	5,640	2,744,712	7,520	No.	9
2	205	2	205									410,625	1,125	547,500	1,500	No.	10
2	668	2	668									1,907,125	5,225	2,542,833	6,967	No.	11
81	14,510	77	10,300	3	1,810	1	2,400	20	3,379	See p. 398.	See p. 401.	122,837,915	62,569	130,460,624	83,453	No.	12
3	410	3	410					2	175			320,500	878	427,333	1,170	No.	13
4	900	4	900					2	300			1,868,800	5,120	2,491,800	6,827	No.	14
3	480	3	480							See p. 398.		598,600	1,640	798,134	2,187	No.	15

¹ For 6 months only.
² For 10 months only.
³ For 4 months only.

¹⁰ For 20 companies only, and includes 4 companies operating part of year.
¹¹ For 3 months only.
¹² For 18 companies only.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.						WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.				
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.			1,000 H. P. and over.		H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.		No.	H. P.					
IOVA.—Continued.																
5	State Electric ³	2	6	2,400	5	1,400			1	1,000				12	1,600	
6	Omaha and Council Bluffs.....	1	8	1,025	8	1,025					1	85	3	1,250		
7	Tri-City Railway.....	1	6	4,500	4	1,350	1	750	1	2,400			19	3,800		
8	Des Moines City Railway ⁴															
9	Interurban Railway.....	1	8	2,150	7	1,450	1	700					12	1,850		
10	Union Electric.....	1	4	750	4	750							4	600		
11	Fort Dodge Light and Power.....															
12	Fort Madison Street Railway ⁵	1	2	200	2	200							3	220		
13	Independence and Rush Park.....	1	3	800	3	800							2	600		
14	Keokuk Railway and Power.....	1	4	500	4	500							4	380		
15	Marshalltown Light, Power and Railway.....	1	2	600	2	600							4	500		
16	Mason City and Clear Lake.....	1	2	780	2	780							3	450		
17	Citizens Railway and Light.....	1	4	1,100	4	1,100							6	1,600		
18	Ottumwa Traction and Light.....															
19	Red Oak Street Railway.....	1	2	1,850			2	1,350					5	850		
20	Sioux City Traction.....	1	3	235	3	235							3	255		
21	Tama and Toledo.....	1	2	1,000	2	1,000							4	400		
22	Waterloo and Cedar Falls.....															
KANSAS.																
Total for state.....		7	11	3,715	9	2,615	2	1,100					19	3,105		
Arkansas City Street Railway.....																
1	Atchison Railway, Light and Power.....	1	1	450	1	450							2	500		
2	Fort Scott Consolidated Supply.....	1	1	300	1	300							2	230		
3	Hutchinson Street Railway.....															
4	Iola Electric Railroad.....	1	1	450	1	450							2	400		
5	Electric Railway and Ice.....	1	1	200	1	200							2	200		
6	Kansas City-Leavenworth ⁶															
7	Pittsburg Railroad.....	1	2	400	2	400							3	350		
8	Consolidated Street Railway.....															
9	Topeka Railway.....	1	2	800	2	800							5	625		
10	Wichita Railroad and Light.....	1	3	1,115	1	15	2	1,100					3	800		
11	Union Street Railway.....															
KENTUCKY.																
Total for state.....		9	31	15,995	21	4,095	7	4,700	3	7,200		5	65	53	13,670	
Bowling Green Railway.....																
1	Cincinnati, Newport and Covington.....	1	3	2,200	2	1,000			1	1,200			2	8	3,000	
2	Frankfort and Suburban.....	1	1	225	1	225							1	225		
3	Henderson Street Railway.....	1	2	220	2	220							2	150		
4	Lexington Railway.....	1	7	2,330	4	630	3	1,700					7	1,625		
5	Georgetown and Lexington ⁷															
6	Louisville Railway.....	1	6	9,000			4	8,000	2	6,000		4	50	22	6,000	
7	Louisville, Anchorage and Pewee.....	1	2	400	2	400					1	15	2	800		
8	Kentucky and Indiana ⁸															
9	Maysville Street Railroad.....		(⁸)													
10	Owensboro City Railroad.....	1	2	160	2	160							2	220		
11	Paducah City Railway.....	1	7	1,300	7	1,300							7	1,400		
LOUISIANA.																
Total for state.....		7	23	13,550	16	5,000	2	1,650	5	6,900			38	8,069		
Baton Rouge Electric and Gas.....																
1	Lake Charles Street Railway.....	1	3	800	3	800							4	400		
2	St. Charles Street Railroad.....	1	4	1,700	3	900	1	800					3	615		
3	Orleans Railroad.....	1	2	600	2	600							2	534		
4	New Orleans Railways.....	1	5	6,500			1	850	4	5,650			18	3,150		
5	New Orleans and Carrollton.....	2	7	3,250	6	2,000			1	1,250			8	2,920		
6	Algiers, McDonoghville and Gretna.....															
7	Shreveport Belt Railway.....	1	2	700	2	700							3	450		
MAINE.																
Total for state.....		19	25	9,740	20	5,840	4	2,350	1	1,550	3,325		34	7,010		
Augusta, Winthrop and Gardiner.....																
1	Public Works.....	1	2	1,200			2	1,200		2,000			3	810		
2	Penobscot Central Railway.....	1	2	700	2	700							3	375		
3	Bangor, Orono and Old Town ⁹															
4	Bangor, Hampden and Winterport ⁹															
5	Biddeford and Saco.....	1	3	575	3	575							3	550		
6	Calais Street Railway.....	1	1	175	1	175							1	200		
7	Benton and Fairfield.....	1	(⁹)													
8	Fryeburg Horse Railway.....															
9	Atlantic Shore Line ⁹															
10	Lewiston, Brunswick and Bath.....	3	3	1,200	3	1,200							4	700		
11	Norway and Paris ⁹															
12	Portland Railroad.....	2	5	3,300	3	1,200	1	550	1	1,550			8	2,500		
13	Portsmouth, Kittery and York.....	1	3	800	3	800							3	550		
14	Rockland, Thomaston and Camden.....	1	2	850	1	250	1	600					3	375		
15	Sanford and Cape Porpoise.....	1	1	90	1	90							1	100		
16	Skowhegan and Norridgewock Railway and Power.....	1	(⁹)							75						
17	Somerset Traction ⁹	1														
18	Waterville and Fairfield Railway and Light.....	3	1	400	1	400				1,250			2	400		

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ Power rented.⁴ Includes figures for Interurban Railway Company.⁵ For 7 companies only.⁶ This company failed to make a report.

GENERAL TABLES.

335

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
8	1,401	7	791	1	610							1,899,568	5,122	2,492,757	6,829	No.	5
8	1,000	8	1,000									3,120,547	8,549	4,160,635	11,399	Yes.	6
15	4,650	14	2,250			1	2,400			See p. 398.		4,626,375	12,675	6,168,500	16,900	No.	7
										See p. 398.	See p. 401.					No.	8
15	1,166	15	1,166					3	666	See p. 398.		1,378,970	3,778	1,838,627	5,037	Yes.	9
4	230	4	230					2	200			832,565	2,281	1,109,965	3,041	Yes.	10
																No.	11
2	200	2	200									54,750	150	73,000	200	No.	12
4	525	4	525					3	500			1,008,890	2,764	1,345,025	3,685	Yes.	13
3	295	3	295					3	540	See p. 398.		602,250	1,650	803,000	2,200	Yes.	14
2	600	2	600							See p. 398.		1,606,000	4,400	2,141,455	5,867	No.	15
2	335	2	335							See p. 398.		359,890	986	479,853	1,315	Yes.	16
3	725	3	725					2	600	See p. 398.		1,460,000	4,000	1,957,130	5,362	Yes.	17
																No.	18
2	1,200	2	1,200					2	123	See p. 398.		2,037,140	5,636	2,742,610	7,514	Yes.	19
2	193	2	193					1	275	See p. 398.	See p. 401.	87,600	240	116,800	320	Yes.	20
1	200	1	200									985,500	2,700	1,314,000	3,600	Yes.	21
																No.	22
21	3,254	21	3,254					3	560	See p. 398.		² 3,585,723	9,823	² 4,780,964	13,097		
																No.	1
3	900	3	900									246,375	675	328,500	900	No.	2
2	267	2	267									135,780	372	181,040	496	Yes.	3
																No.	4
1	450	1	450									271,750	744	362,333	992	No.	5
1	125	1	125									39,420	108	52,560	144	Yes.	6
																No.	7
1	200	1	200					1	160			706,275	1,935	941,700	2,580	Yes.	8
																No.	9
9	760	9	760									1,178,723	3,229	1,571,631	4,305	No.	10
4	552	4	552					2	400	See p. 398.		1,007,400	2,760	1,343,200	3,680	Yes.	11
																No.	12
31	14,332	23	3,599	5	3,533	3	7,200	10	1,473	See p. 398.		⁷ 24,831,481	68,032	⁷ 33,108,267	90,708		
																No.	1
1	133	1	133									197,100	540	262,800	720	No.	2
3	2,200	2	1,000			1	1,200					1,022,000	2,800	1,362,545	3,733	No.	3
2	250	2	250									310,980	852	414,640	1,136	No.	4
2	265	2	265									350,400	960	467,200	1,280	No.	5
4	1,199	3	666	1	533			5	773			1,348,346	3,694	1,797,795	4,925	Yes.	6
																No.	7
6	9,000			4	3,000	2	6,000			See p. 398.		12,956,718	35,498	17,275,614	47,331	No.	8
2	335	2	335									3,358,000	9,200	4,477,090	12,266	No.	9
																No.	10
2	185	2	185									141,437	388	188,583	517	Yes.	11
2	160	2	160									⁹ 219,000	600	⁹ 292,000	800	No.	12
7	605	7	605					5	700	See p. 398.		4,927,500	13,500	6,570,000	18,000	Yes.	
31	12,268	23	4,602	5	3,363	3	4,303	1	73	See p. 398.		¹⁰ 28,835,085	79,000	¹⁰ 38,446,537	105,333		
																No.	1
6	425	6	425					1	73			1,271,660	3,484	1,695,425	4,645	Yes.	2
																No.	3
4	1,490	3	807	1	673							2,472,875	6,775	3,297,045	9,033	No.	4
2	269	2	269									1,485,550	4,070	1,980,733	5,427	No.	5
8	6,388	2	538	4	2,690	2	3,160			See p. 398.		15,330,000	42,000	20,440,000	56,000	No.	6
7	3,026	6	1,883			1	1,143					6,935,000	19,000	9,246,667	25,333	No.	7
																No.	8
4	680	4	680									1,340,000	3,671	1,786,667	4,895	Yes.	
45	9,478	39	5,678	6	3,800			10	3,083	See p. 398.	See p. 401.	¹¹ 25,578,242	70,129	¹¹ 34,104,558	93,506		
																Yes.	1
4	602	4	602									985,500	2,700	1,314,000	3,600	Yes.	2
8	900	8	900					2	1,000	See p. 398.	See p. 401.	2,306,000	6,318	3,074,666	8,424	Yes.	3
2	750	2	750								See p. 401.	481,800	1,320	642,400	1,760	No.	4
																No.	5
										See p. 398.						No.	6
3	575	3	575									200,750	550	267,545	733	Yes.	7
1	135	1	135									400,600	1,098	534,133	1,464	Yes.	8
1	133	1	133									148,555	407	198,073	543	No.	9
																No.	10
1	400	1	400					3	1,000	See p. 398.	See p. 401.	5,712,250	15,650	7,616,090	20,866	No.	11
1	85		85													No.	12
6	3,800			6	3,800					See p. 398.		4,613,570	12,640	6,151,423	16,853	No.	13
3	750	3	750							See p. 398.	See p. 401.	657,000	1,800	876,000	2,400	No.	14
8	575	8	575					1	250			1,200,437	3,289	1,600,583	4,385	Yes.	15
2	150	2	150									565,750	1,550	754,455	2,067	No.	16
1	110	1	110									¹² 71,630	247	¹² 95,990	331	No.	17
																No.	18
4	513	4	513					4	833	See p. 398.	See p. 401.	8,234,400	22,560	10,979,200	30,080	Yes.	19

¹ For 10 companies only, and includes 1 company operating part of year.
² Steam power rented.
³ For 6 months only.

¹⁰ For 6 companies only.
¹¹ For 13 companies only, and includes 1 company operating part of year.
¹² For 10 months only.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
MARYLAND.																
	Total for state.....	13	47	27,400	27	7,400	15	10,100	5	9,900					73	18,635
1	United Railways.....	10	40	24,500	21	5,100	14	9,500	5	9,900					66	17,135
2	Cumberland Electric Railway ⁴															
3	Frederick and Middletown.....	1	2	1,000	1	400	1	600							2	250
4	Kensington Railway ⁴															
5	Cumberland and Westernport.....	1	2	700	2	700									2	700
6	Hagerstown Railway.....	1	3	1,200	3	1,200									3	550
7	Baltimore and Washington ⁴	1														
8	Washington and Glen Echo ⁴															
9	Washington and Rockville ⁴															
10	Washington, Woodside and Forest Glen ⁴															
MASSACHUSETTS.																
	Total for state.....	72	209	133,850	136	43,020	37	21,780	36	69,060	1,732	25	598	324	80,690	
1	Amherst and Sunderland.....	1	2	400	2	400									2	300
2	Interstate Consolidated ⁴															
3	Lexington and Boston.....	1	3	930	3	930									4	1,000
4	Old Colony Street Railway.....	8	38	15,820	23	6,640	14	8,180	1	1,000					52	10,023
5	Boston and Northern.....	10	30	18,575	12	3,675	13	7,150	5	7,750		8	75		42	11,130
6	Boston Elevated Railway.....	8	38	54,450	17	5,550	1	700	20	48,200		8	28		81	28,770
7	Lowell and Boston ⁴															
8	New York, New Haven and Hartford Railroad.....	1	2	2,000					2	2,000					8	1,200
9	Blue Hill Street Railway.....	1	2	650	2	650									3	450
10	Hoosac Valley.....	1	3	1,450	2	800	1	650							5	1,250
11	Concord, Maynard and Hudson.....	1	2	700	2	700									2	700
12	Conway Electric Railway.....	1	1	100	1	100									1	125
13	Cottage City and Edgartown ⁴															
14	Norfolk Western Railway ⁴															
15	Greenfield and Deerfield ⁴															
16	Providence and Fall River ⁴															
17	Dartmouth and Westport ⁴															
18	Fitchburg and Leominster.....	1	3	1,310	2	660	1	650							6	1,200
19	Frammingham Union Street Railway ⁴															
20	Gardner, Westminster and Fitchburg.....	2	2	600	2	600									3	600
21	Greenfield and Turners Falls.....	2									440					
22	Haverhill and Southern New Hamp- shire. ⁴															
23	Haverhill, Georgetown and Danvers ⁴															
24	Haverhill and Amesbury.....	1	1	500	1	500									4	500
25	Holyoke Street Railway.....	1	5	4,000	3	1,200			2	2,800					5	2,000
26	Lawrence and Reading.....	1	2	600	2	600									2	500
27	Lawrence and Methuen ⁴															
28	Middleton and Danvers ⁴															
29	Norfolk and Bristol.....	1	2	900	2	900									2	500
30	Marlboro Street Railway.....	1	2	500	2	500									3	600
31	Marlboro and Westboro.....	1	2	800	2	800									2	500
32	Medfield and Medway ⁴															
33	Middleboro, Wareham and Buzzards Bay. ⁴															
34	Milford, Attleboro and Woonsocket.....	1	2	750	2	750									3	600
35	Milford and Uxbridge.....	1	5	2,100	4	1,200	1	900							5	750
36	Natick and Cohituate ⁴															
37	South Middlesex Street Railway.....	1	3	950	3	950									3	450
38	Union Street Railway.....	1	4	3,100	2	600			2	2,500		10	300		8	1,800
39	New Bedford and Onset.....	1	3	750	3	750									4	1,200
40	Citizens Electric Railway.....	1	2	950	1	350	1	600				3	35		5	875
41	Georgetown, Rowley and Ipswich.....	1	2	500	2	500									3	700
42	Commonwealth Avenue ⁴															
43	Wellesley and Boston ⁴															
44	Newton and Boston.....	1	4	1,100	4	1,100									4	750
45	Newton Street Railway ⁴															
46	Northampton Street Railway.....	1	5	1,200	4	600	1	600							6	840
47	Northampton and Amherst.....	1	1	300	1	300									2	300
48	Haverhill and Andover ⁴															
49	Norton and Taunton.....	1	2	700	2	700									2	500
50	Athol and Orange ⁴															
51	Pittsfield Electric ⁴		1	250	1	250						1	160			
52	Plymouth and Sandwich ⁴															
53	Brockton and Plymouth.....	1	3	1,200	3	1,200									4	600
54	Norwood, Canton and Sharon ⁴															
55	Shelburne Falls and Coleraine.....	1	1	250	1	250					250				1	250
56	Southbridge and Sturbridge ⁴															
57	Hampshire Street Railway ⁴															
58	Springfield Street Railway.....	1	4	4,800					4	4,800					8	2,000
59	Springfield and Eastern.....	1	2	950	2	950					450				2	512
60	Stoughton and Randolph ⁴															
61	East Taunton Street Railway ⁴															
62	Bristol County.....	1	2	840	2	840									2	840
63	Templeton Street Railway.....	1	2	375	2	375									4	500
64	Martha Vineyard ⁴															
65	Upton Street Railway ⁴															
66	Reading, Wakefield and Lynnfield ⁴															
67	Hampshire and Worcester.....	1	2	500	2	500									2	500
68	Warren, Brookfield and Spencer.....	1	2	850	1	300	1	550							2	875

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ For 4 companies only, and includes 1 company operating part of year.⁴ Power rented.⁵ For 2½ months only.

GENERAL TABLES.

337

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ²		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
52	24,565	37	8,901	10	6,064	5	9,600	2	240	See p. 398.	See p. 401.	*42,811,678	118,298	*57,082,116	157,730		
40	22,424	25	6,760	10	6,064	5	9,600			See p. 398.		40,760,645	111,673	54,347,405	148,897	No.	1
2	584	2	584									780,735	2,139	1,040,980	2,862	No.	2
2	667	2	667									*84,048	1,236	*112,064	1,648	No.	3
8	890	8	890					2	240			1,186,250	3,250	1,581,667	4,333	No.	4
											See p. 401.					No.	5
																No.	6
																No.	7
																No.	8
																No.	9
																No.	10
306	123,998	240	47,532	35	22,772	31	53,694	11	2,914	See p. 398.	See p. 401.	*189,431,406	524,462	*253,008,569	700,529		
2	266	2	266							See p. 398.		328,500	900	438,000	1,200	No.	1
3	960	3	960							See p. 398.		2,190,000	6,000	2,920,000	8,000	No.	2
65	16,028	53	8,461	12	7,567			3	247	See p. 398.		19,321,265	52,935	25,899,819	70,959	Yes.	3
38	18,587	26	7,387	9	6,983	3	4,267			See p. 398.	See p. 401.	33,092,152	90,663	44,359,453	121,532	Yes.	4
80	47,921	53	4,325	7	3,733	20	39,863	2	667	See p. 398.	See p. 401.	86,011,178	236,647	114,681,570	314,196	Yes.	5
2	1,340			2	1,340							*1,225,020	6,414	*1,642,118	8,597	No.	6
2	650	2	650									678,760	1,860	905,013	2,480	Yes.	7
3	850	3	850							See p. 398.		1,173,542	3,215	1,573,150	4,310	No.	8
2	670	2	670									668,888	1,831	896,962	2,454	No.	9
1	100	1	100									160,600	440	214,134	583	No.	10
*2	120	2	120							See p. 398.	See p. 401.					No.	11
																No.	12
																No.	13
																No.	14
																No.	15
																No.	16
3	1,225	2	660	1	565							2,774,000	7,600	3,698,667	10,134	No.	17
2	600	2	600									1,296,845	3,553	1,729,127	4,737	No.	18
3	399	3	399							See p. 398.		449,540	1,232	602,615	1,651	Yes.	19
																No.	20
8	890	8	890									1,376,050	3,700	1,876,100	5,140	No.	21
5	4,000	3	1,200			2	2,800	1	100	See p. 398.		3,040,482	8,330	4,063,976	11,107	Yes.	22
2	600	2	600									752,252	2,061	1,008,495	2,763	Yes.	23
																No.	24
2	667	2	667									*513,310	1,406	*684,413	1,874	Yes.	25
2	634	2	634									698,410	1,913	938,206	2,564	Yes.	26
2	700	2	700							See p. 398.		335,054	918	449,315	1,231	Yes.	27
																No.	28
2	767	2	767									1,907,125	5,225	2,421,045	6,633	No.	29
3	1,400	2	500	1	900			2	300	See p. 398.	See p. 401.	2,145,835	5,879	2,961,235	7,839	No.	30
																No.	31
3	1,150	2	550	1	600							992,800	2,720	1,323,733	3,626	Yes.	32
4	3,100	2	600			2	2,500					2,942,496	8,061	3,923,328	10,748	Yes.	33
3	750	3	750									866,815	2,374	1,156,753	3,165	Yes.	34
2	564	1	330	1	534							529,250	1,450	706,667	1,934	Yes.	35
2	700	2	700									602,250	1,650	803,000	2,200	Yes.	36
																No.	37
4	1,100	4	1,100							See p. 398.		2,555,000	7,000	3,406,545	9,333	Yes.	38
5	1,200	4	600	1	600							1,889,313	5,176	2,519,084	6,901	No.	39
1	400	1	400									564,090	1,600	831,835	2,279	No.	40
2	333	2	333									730,000	2,000	973,333	2,667	No.	41
*2	250	2	250													No.	42
*2	450	2	450													No.	43
2	667	2	667					1	400	See p. 398.	See p. 401.	1,061,130	2,962	1,441,507	3,949	Yes.	44
2	200	2	200									168,440	456	221,920	608	Yes.	45
																No.	46
4	4,264					4	4,264					6,348,528	17,393	8,464,697	23,187	No.	47
3	1,075	3	1,075							See p. 398.		1,299,190	3,560	1,732,260	4,750	No.	48
																No.	49
2	533	2	533									657,000	1,800	876,000	2,400	No.	50
2	525	2	525									729,270	1,998	977,574	2,678	No.	51
																No.	52
2	500	2	500									209,500	574	280,685	769	No.	53
2	675	2	675							See p. 398.		1,916,250	5,250	2,568,870	7,088	Yes.	54

¹ For 44 companies only, and includes 3 companies operating part of year.
² For 6½ months only.

³ Owned but not operated.
⁴ For 10½ months only.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
MASSACHUSETTS—Continued.																
69	Webster and Dudley	1	(²)													
70	Woronoco Street Railway	1	2	300	2	300									3	350
71	Linwood Street Railway ⁴															
72	Worcester Consolidated	5	9	3,650	8	3,050	1	600			592				14	2,025
73	Worcester and Blackstone Valley	1	2	1,000	2	1,000									3	750
74	Worcester and Southbridge	1	2	1,200			2	1,200							4	1,200
75	Worcester and Webster	1	2	1,000	2	1,000									3	675
MICHIGAN.																
Total for state		32	85	45,942	61	19,642	11	7,900	13	18,400		27	749	127	27,923	
1	Adrian Street Railway		(²)													
2	Bay Cities Consolidated	1	2	1,600			2	1,600				1	7	3	1,000	
3	Benton Harbor and St. Joseph	1	3	750	3	750								3	700	
4	Detroit United Railway	4	20	17,600	12	4,600			8	13,000		3	30	47	11,525	
5	Detroit and Port Huron Shore Line	1	5	3,080	2	80			3	3,000		4	20	4	1,400	
6	Detroit, Ypsilanti, Ann Arbor and Jackson	7	12	5,160	12	5,160						5	27	6	1,500	
7	Escanaba Electric Railway	1	1	300	1	300						1	80	2	300	
8	Grand Rapids Railway	1	3	3,000			1	600	2	2,400		1	5	6	1,325	
9	Grand Rapids, Grand Haven and Muskegon	3	7	2,600	7	2,600								4	1,448	
10	Grand Rapids, Holland and Lake Michigan	1	2	1,500			2	1,500				5	70	4	1,200	
11	Houghton County Street Railway	2	2	1,500			2	1,500						5	600	
12	Twin City General Electric	1	2	575	2	575						1	80	5	450	
13	Negaunee and Ishpeming	1	3	575	3	575						1	125	4	450	
14	Jackson and Suburban Traction ⁴															
15	Michigan Traction ⁴															
16	Lansing City Electric ⁴															
17	Manistee, Flier City and Eastlake	1	3	900	2	200	1	700						2	220	
18	Marquette and Presque Isle	1	2	385	2	385								4	400	
19	Menominee Light, Railway and Power	1	3	950	3	950								5	500	
20	Toledo and Monroe	1	2	1,200			2	1,200						2	1,000	
21	Muskegon Traction and Lighting	1	3	1,067	3	1,067						2	20	2	1,000	
22	Detroit, Plymouth and Northville	1	2	500	2	500						1	250	4	1,000	
23	Owosso and Corunna Electric	1	3	500	3	500								3	330	
24	Saginaw Valley Traction	1	5	2,200	4	1,400	1	800				1	5	5	525	
												1	30	9	2,050	
MINNESOTA.																
Total for state		6	19	10,325	12	2,600	1	525	6	7,200	10,280	7	950	34	6,410	
1	Interstate Traction ⁴															
2	Duluth-Superior Traction	2	5	2,400	4	1,200			1	1,200		1	50	9	1,500	
3	Twin City Rapid Transit	3	9	7,125	3	600	1	525	5	6,000	10,280			20	4,210	
4	Benton Power and Traction ⁴															
5	Winona Railway and Light	1	5	800	5	800						6	900	5	700	
MISSISSIPPI.																
Total for state		5	9	2,555	9	2,555								13	2,080	
1	Greenville Light and Car	1	1	120	1	120								1	100	
2	Jackson Railway, Light and Power	1	2	800	2	800								4	600	
3	Meridian Light and Railway	1	3	675	3	675								4	450	
4	Natchez Railway and Power	1	1	160	1	160								(¹⁸) 4	880	
5	Vicksburg Railroad, Power and Manufacturing	1	2	800	2	800										
MISSOURI.																
Total for state		22	68	64,520	27	7,770	16	11,650	25	45,100		12	585	170	48,270	
1	Citizens Street Railway															
2	Carrollton Electric Railway ⁴															
3	Clinton Street Railway															
4	Hannibal Railway and Electric	1	1	100	1	100								1	100	
5	Southwest Missouri Electric Railway	2	5	2,350	4	1,150			1	1,200				6	1,925	
6	Metropolitan	8	16	12,800	9	3,400	3	2,100	4	7,300				37	10,600	
7	Missouri Water, Light and Traction	1	3	500	3	500								2	300	
8	St. Joseph Railway, Light, Heat and Power	1	5	3,350	1	200	3	1,950	1	1,200				9	2,540	
9	St. Louis Transit	4	23	36,600			7	5,200	16	31,400		12	585	75	25,350	
10	St. Louis and Suburban	1	5	5,800			2	1,800	3	4,000				19	4,000	
11	St. Louis and Meramec River ⁴															
12	St. Louis and Kirkwood		3	1,000	2	400	1	600						8	800	
13	St. Louis, St. Charles and Western	2	3	1,200	3	1,200								6	1,750	
14	Railway and Electric of Sedalia	1	3	520	3	520								4	575	
15	Kickapoo Transit															
16	Springfield Traction	1	1	300	1	300								3	330	
MONTANA.																
Total for state		3	4	1,350	3	650	1	700			250			8	1,175	
1	Anaconda Copper Mining	2	1	350	1	350					250			3	175	
2	Bozeman Street Railway ⁴															
3	Butte Electric Railway	1	3	1,000	2	300	1	700						5	1,000	
4	Great Falls Street Railway ⁴															
5	Helena Power and Light ⁴															

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ Steam power rented.⁴ Power rented.⁵ For 24 months only.⁶ For 21 companies only, and includes 5 companies operating part of year.⁷ For 10 months only.⁸ For 11 months only.⁹ Owned but not operated.¹⁰ For 9 months only.

GENERAL TABLES.

339

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horse power hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
2	270	2	270									193,085	529	257,447	705	No....	69
3	291	3	291							See p. 398.		737,862	2,022	989,150	2,710	No....	70
14	3,967	14	3,967							See p. 398.		2,515,215	6,891	3,371,602	9,188	No....	71
2	870	2	870							See p. 398.		572,412	1,568	767,230	2,102	Yes....	72
2	500	2	500					2	1,200	See p. 398.	See p. 401.	223,002	3,097	297,336	4,129	No....	73
												952,200	2,609	1,269,600	3,479	Yes....	74
87	29,518	68	10,703	9	5,204	10	13,611	39	11,662	See p. 398.	See p. 402.	*83,354,048	230,362	*111,226,532	307,705		
1	60	1	60									90,155	247	120,450	330	No....	1
2	1,000	2	1,000									1,277,500	3,500	1,703,455	4,667	Yes....	2
5	567	5	567					3	400			587,182	1,609	782,909	2,125	Yes....	3
19	16,000	5	1,333	6	3,200	8	11,467	1	333	See p. 398.	See p. 402.	44,843,674	122,859	59,791,565	163,812	Yes....	4
5	1,307	4	640	1	667			3	2,000	See p. 398.	See p. 402.	6,022,500	16,500	8,030,000	22,000	Yes....	5
5	1,175	5	1,175					5	1,250	See p. 398.	See p. 402.	5,791,828	15,868	7,722,437	21,137	No....	6
1	200	1	200							See p. 398.		7680,960	2,240	1,907,747	2,987	Yes....	7
4	2,714	2	570			2	2,144					6,353,149	17,466	8,516,286	23,332	No....	8
2	100	2	100					5	1,675	See p. 398.	See p. 402.	*2,672,000	8,000	*3,581,769	10,723	Yes....	9
								2	1,333	See p. 398.	See p. 402.	2,568,100	7,858	3,824,133	10,477	No....	10
1	667			1	667			1	667	See p. 398.	See p. 402.	*2,049,187	6,135	*2,732,249	8,180	No....	11
4	225	4	225					5	320			854,100	2,340	1,138,800	3,120	Yes....	12
3	205	3	205					2	335	See p. 398.		366,400	1,004	488,533	1,338	Yes....	13
*3	400	3	400													No....	14
*6	720	6	720							See p. 398.	See p. 402.					No....	15
*1	200	1	200													No....	16
3	470	3	470							See p. 398.		102,336,000	6,400	13,114,666	8,533	Yes....	17
2	160	2	160					2	150			278,750	750	365,000	1,000	Yes....	18
9	635	9	635					2	1,067	See p. 398.	See p. 402.	353,176	968	470,901	1,291	Yes....	19
1	400	1	400					3	800	See p. 398.		1,095,000	3,000	1,460,000	4,333	No....	20
3	480	3	480							See p. 398.		7706,060	2,354	1,941,413	3,138	Yes....	21
4	426	4	426					2	126			232,687	637	310,249	849	No....	22
3	1,407	2	737	1	670			3	1,206	See p. 398.		420,000	1,151	560,000	1,535	Yes....	23
												3,480,640	9,536	4,663,970	12,778	Yes....	24
67	13,420	62	9,830	3	1,590	2	2,000	9	8,100	See p. 399.	See p. 402.	139,153,469	107,270	152,204,738	143,040		
19	2,850	16	1,260	3	1,590							3,374,391	9,245	4,499,188	12,326	No....	1
38	10,000	36	8,000			2	2,000	8	8,000	See p. 399.	See p. 402.	35,040,000	96,000	46,720,000	128,000	Yes....	2
10	570	10	570					1	100			739,078	2,025	985,550	2,714	No....	3
																Yes....	4
14	2,598	14	2,598					9	1,556			13,016,565	8,807	17,402,086	11,742		5
1	130	1	130									146,000	400	194,666	533	Yes....	1
6	1,241	6	1,241					3	573			969,075	2,655	1,292,100	3,540	Yes....	2
3	367	3	367					2	533			439,560	1,204	586,080	1,605	Yes....	3
2	400	2	400									141,360	930	148,480	1,240	No....	4
2	460	2	460					4	450			1,320,570	3,618	1,760,760	4,824	Yes....	5
68	53,119	36	6,444	12	8,284	20	38,391	11	7,683	See p. 399.	See p. 402.	132,903,282	364,119	157,204,619	485,493		
																No....	1
1	110	1	110									262,800	720	350,400	960	No....	2
4	900	4	900					1	900			3,489,400	9,560	4,632,533	12,747	Yes....	3
11	9,300	4	1,200	4	2,400	3	5,700			See p. 399.	See p. 402.	24,455,000	67,000	32,606,667	89,333	No....	4
1	100	1	100					1	167			628,530	1,722	838,040	2,296	Yes....	5
4	2,150	2	300	2	1,850			3	1,500	See p. 399.		7,248,170	19,858	9,664,470	26,478	Yes....	6
22	34,336	2	294	5	3,484	15	30,558	2	3,216	See p. 399.	See p. 402.	83,558,355	228,927	111,411,140	305,236	No....	7
10	3,533	8	1,400			2	2,133	1	1,600	See p. 399.	See p. 402.	12,307,470	33,719	16,409,960	44,959	Yes....	8
3	950	2	400	1	550					See p. 399.						No....	9
3	1,000	3	1,000													No....	10
5	420	5	420					3	300	See p. 399.	See p. 402.	390,205	1,070	520,273	1,427	Yes....	11
																No....	12
4	320	4	320									563,352	1,543	751,136	2,057	Yes....	13
																No....	14
6	1,532	5	832	1	700						See p. 402.	172,128,202	5,831	17,837,602	7,775		15
4	532	4	532									458,692	1,257	611,589	1,67	Yes....	1
2	1,000	1	300	1	700							1,669,510	4,574	2,226,013	6,099	No....	2
																No....	3
																No....	4
																No....	5

¹¹ For 3 companies only.

¹² For 5 companies only, and includes 1 company operating part of year.

¹³ Steam rented.

¹⁴ For 5 months only.

¹⁵ For 10 companies only.

¹⁶ Includes output of St. Louis and Kirkwood Railroad Co.

¹⁷ For 2 companies only.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, number.	STEAM ENGINES.								WATER-POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
NEBRASKA.																
	Total for state	8	14	5,100	10	2,150	3	1,750	1	1,200					37	4,795
1	Lincoln Traction	1	7	1,600	6	1,050	1	550							8	1,295
2	Nebraska City Street Railway															
3	Omaha Street Railway	2	7	3,500	4	1,100	2	1,200	1	1,200					29	3,500
4	Metropolitan Cable Railway ⁴															
NEW HAMPSHIRE.																
	Total for state	5	13	4,015	12	3,265	1	750							9	1,400
1	Concord Street Railway	1	2	500	2	500									3	400
2	Chester and Derry ⁴															
3	Exeter, Hampton and Amesbury	1	5	1,645	4	895	1	750							(7)	
4	Keene Electric Railway	1	2	220	2	220									2	200
5	Laconia Street Railway	1	2	850	2	850									2	300
6	Manchester Street Railway ⁴															
7	Portsmouth Electric Railway	1	2	800	2	800									2	500
NEW JERSEY.																
	Total for state	25	69	31,130	50	13,580	11	7,000	8	10,550		2	10		108	22,560
1	West Jersey and Seashore	1	4	1,350	3	750	1	600							4	950
2	Bridgeton and Millville ⁴	2														
3	Brigantine Transportation	1	2	300	2	300									3	400
4	Camden, Gloucester and Woodbury	1	3	750	3	750									3	750
5	Camden and Suburban	1	7	3,300	5	900			2	2,400					10	2,100
6	Cape May, Delaware Bay and Sewells Point	1	2	635	2	635									3	750
7	Elizabeth, Plainfield and Central Jersey ⁴															
8	New Jersey and Hudson River Railway and Ferry	1	3	1,190	2	440	1	750							4	1,440
9	Jersey City, Hoboken and Paterson	2	9	3,750	9	3,750									14	2,900
10	North Jersey Street Railway	3	19	11,900	10	2,500	4	2,250	5	7,150		2	10		33	7,050
11	Jersey Central Traction	1	1	150	1	150									2	350
12	Monmouth County Electric ⁴															
13	Atlantic Coast Electric Railroad	2	2	1,650			2	1,650							8	2,085
14	Millville Traction	1	2	600	2	600									2	300
15	Mt. Holly Street Railway															
16	Middlesex and Somerset	1	4	1,575	3	825	1	750							6	750
17	Ocean City Electric Railroad		(11)													
18	Orange and Passaic Valley ⁴															
19	South Orange and Maplewood ⁴															
20	Raritan Traction ⁴															
21	Point Pleasant Traction, Electric Light and Power	1	3	580	3	580									4	460
22	Newark and Hackensack	1	3	900	3	900									3	950
23	Trenton Street Railway	1	3	2,000			2	1,000	1	1,000					6	750
24	Camden and Trenton ⁴	2														
25	Trenton, Lawrenceville and Princeton	1	1	350	1	350									2	400
26	Orange Mountain Traction	1	1	150	1	150									1	175
NEW MEXICO.																
	Total for territory															
1	Albuquerque Street Railroad															
NEW YORK.																
	Total for state	94	278	228,733	194	53,996	38	26,487	46	148,250	148,745	79	2,292		525	131,040
1	Albany and Hudson Railway and Power	1	3	2,950			1	750	2	2,200	5,300	2	150		3	1,450
2	United Traction	5	10	5,350	5	1,350	5	4,000							21	4,000
3	Hudson Valley Railway	5	9	3,300	9	3,300					1,300				12	2,250
4	Troy and New England	1	2	480	2	480									3	525
5	Amsterdam Street Railroad	1	6	766	6	766									5	645
6	Auburn City Railway	1	2	750	2	750									4	400
7	Auburn Interurban Electric ⁴															
8	Ballston Terminal Railroad	1	1	350	1	350									2	408
9	Binghamton Railway	2	5	1,500	4	750	1	750							5	1,000
10	International Railway	8	14	8,450	5	1,100	6	3,600	3	3,750		1	50		24	7,550
11	Crosstown Street Railway ⁴															
12	Buffalo and Depew	1	2	650	2	650									4	600
13	Buffalo, Hamburg and Aurora	1	2	800	2	800									4	800
14	Ontario Light and Traction	1	2	400	2	400					275				2	400
15	Catskill Electric Railway	1	1	175	1	175									2	200
16	Cohoes City Railway ⁴															
17	Cortland County Traction	1	4	1,000	4	1,000									4	1,000
18	Corning and Painted Post ⁴															
19	Dunkirk and Fredonia	1	3	460	3	460									3	360
20	Dunkirk and Point Gratiot	1	1	268	1	268									1	300
21	Elmira Water, Light and Railroad	1	6	3,175	4	1,775	2	1,400							7	1,750
22	Ocean Electric Railway ⁴															
23	Citizens Street Railway ⁴															
24	Fonda, Johnstown and Gloversville	1	2	900	1	300	1	600							3	450

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ For 2 companies only.⁴ Power rented.⁵ For 5 companies only.⁶ Owned but not operated.⁷ Steam rented.⁸ For 16 companies only, and includes 4 companies operating part of year.

341

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
29	5,060	27	3,260	2	1,800			2	250			\$12,181,875	33,375	\$16,242,743	44,500		
8	1,260	8	1,260					2	250			1,848,725	5,065	2,465,210	6,754	Yes	1
21	3,800	19	2,000	2	1,800							10,333,150	28,310	13,777,583	37,746	Yes	2
																No.	3
																No.	4
16	2,469	16	2,469					2	900	See p. 399	See p. 402	\$5,172,718	14,169	\$6,896,712	18,792		
4	666	4	666							See p. 399		467,200	1,280	623,055	1,707	No.	1
*1	138	1	133							See p. 399	See p. 402	3,304,345	9,053	4,405,550	12,070	No.	2
3	470	3	470					2	900	See p. 399		218,610	599	291,235	799	No.	3
3	250	3	250							See p. 399		179,908	490	239,877	553	No.	4
3	300	3	300							See p. 399	See p. 402	1,411,655	2,747	1,336,995	3,663	No.	5
2	650	2	650							See p. 399						No.	6
70	30,042	53	13,802	10	6,690	7	9,550	2	388	See p. 399	See p. 402	\$64,431,568	177,885	\$85,908,467	237,174		7
3	1,267	2	600	1	667					See p. 399		1,679,000	4,600	2,238,667	6,133	No.	1
2	300	2	300							See p. 402		\$36,300	330	\$48,400	440	No.	2
3	750	3	750							See p. 399	See p. 402	1,201,215	3,291	1,601,620	4,888	No.	3
7	3,300	5	900			2	2,400			See p. 399		3,784,315	10,231	4,979,067	13,641	Yes	4
2	980	1	447	1	583					See p. 399		522,451	1,431	696,601	1,908	No.	5
																No.	6
3	1,326	2	586	1	740					See p. 399		1,336,995	3,663	1,782,660	4,884	Yes	7
10	3,720	10	3,720							See p. 399		5,615,525	15,385	7,487,245	20,513	No.	8
19	11,900	10	2,500	4	2,250	5	7,150			See p. 399		45,625,000	125,000	60,833,333	166,666	No.	9
1	125	1	125							See p. 399		\$51,240	280	\$68,320	370	No.	10
*2	333	2	333							See p. 399		2,006,207	5,496	2,674,943	7,328	No.	11
2	1,600	2	534	2	1,600					See p. 399		269,370	738	3			

⁹ For 3½ months only.
¹⁰ For 6 months only.
¹¹ Steam power rented.
¹² For 4 months only.

¹³ For 7 months only.
¹⁴ Includes 2 gas engines of 100 horsepower.
¹⁵ For 64 companies only, and includes 4 companies operating part of year.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
NEW YORK—Continued.																
25	Lake Ontario and Riverside														5	580
26	Geneva, Waterloo, etc., Traction	1	3	665	3	665									1	200
27	Mountain Lake Electric	1	1	200	1	200									2	300
28	Bennington and Hoosick Valley	1	1	300	1	300										
29	Hornellsville Electric Railway ²															
30	Hornellsville and Canisteo ²															
31	Huntington Railroad	1														
32	Ithaca Street Railway	1	3	700	3	700					100 800				3	700
33	Jamestown Street Railway	1	6	900	6	900						1	25		6	1,200
34	Kingston Consolidated	1	4	950	4	950									4	904
35	Lewiston and Youngstown Frontier ²															
36	Lima-Honeoye Light and Railroad	1	2	300	2	300						2	16		2	400
37	Middletown-Goshen Electric	1	3	375	3	375									3	375
38	New York and Long Island Traction ²															
39	Orange County Traction	1	3	750	3	750									4	400
40	New Paltz and Poughkeepsie	1	2	275	2	275									2	200
41	Interurban	3	18	79,075	3	475			15	78,600		50	1,433		90	22,500
42	Central Crosstown															
43	Fulton Street Railroad															
44	Thirty-fourth Street Crosstown ²															
45	Twenty-eighth and Twenty-ninth Street Crosstown. ²															
46	Third Avenue Railroad ²															
47	Forty-second Street, Manhattanville and St. Nicholas Avenue. ²															
48	Dry Dock, East Broadway and Battery ²															
49	Kingsbridge Railway ²															
50	Southern Boulevard Railroad ²															
51	Yonkers Railroad	1	6	1,580	6	1,580									9	1,600
52	Union Railway	1	7	5,500	4	1,500	2	1,500	1	2,500					11	3,000
53	Tarrytown, White Plains and Mamaroneck.	1	3	1,050	3	1,050									5	625
54	Westchester Electric Railroad	1	4	1,400	4	1,400									9	1,000
55	Manhattan Railway (elevated)	1	8	33,600	4	1,600			4	32,000					40	20,800
56	Pelham Park Railroad															
57	City Island Railroad															
58	Brooklyn Rapid Transit	6	37	35,587	6	2,162	14	9,425	17	24,000		9	225		92	22,760
59	Coney Island and Brooklyn	3	16	6,150	15	4,950			1	1,200					18	6,650
60	Van Brunt Street and Erie Basin ²															
61	New York and Queens County	1	4	1,800	4	1,800									8	2,250
62	New York and North Shore	1	2	800	2	800									6	1,200
63	Staten Island Midland	1	3	1,050	3	1,050									4	1,000
64	Staten Island Electric ²															
65	Niagara Gorge Railroad ²															
66	Northport Traction ²															
67	Ogdensburg Street Railway	1									320					
68	Olean, Rock City and Bradford	1	2	1,000	2	1,000						1	150		5	750
69	Olean Street Railway	1	2	450	2	450									2	400
70	Oneida Railway															
71	Oneonta, Cooperstown and Richfield Springs.	1	1	666			1	666							6	900
72	Westchester Traction	1	2	300	2	300									3	450
73	Oswego Traction		(³)													
74	Peekskill Lighting and Railroad	1	5	1,100	5	1,100							5	60	4	600
75	Penn Yan, Keuka Park and Branchport.	1	2	500	2	500									2	500
76	Plattsburg Traction ²															
77	New York and Stamford	1	2	950	1	350	1	600							4	660
78	Port Jervis Electric, Gas and Railroad	1	3	450	3	450									3	450
79	Poughkeepsie and Wappingers Falls	1	3	750	3	750									3	700
80	Rochester Railway	2	7	3,746	5	1,500	1	746	1	1,500					8	2,263
81	Rochester and Suburban	1	3	495	3	495									2	500
82	Rochester and Sodus Bay	1	2	1,000	2	1,000						2	150		4	1,000
83	Rochester, Charlotte and Manitou	1	2	250	2	250									3	350
84	Rome City	1	3	750	3	750						1	3		2	280
85	Schenectady Railway	2	4	950	4	950									5	1,030
86	Sea Cliff Incline Cable	1	2	120	2	120									1	150
87	Southfield Beach Railroad ²															
88	Syracuse Rapid Transit	1	6	4,900	3	1,500	1	900	2	2,500					9	2,500
89	Syracuse and Suburban	1	1	800			1	800			650				2	450
90	Syracuse, Lakeside and Baldwinsville	1	2	1,000	2	1,000									4	1,000
91	Utica and Mohawk Valley	2	6	1,850	5	1,100	1	750							10	1,400
92	Black River Traction	1	1	300	1	300									2	350
93	Elmira and Seneca Lake	1	2	575	2	575									2	500
94	Buffalo, Gardenville and Ebenezer	1	(³)													
95	Hamburg Railway	1	3	950	3	950									3	1,000
96	Buffalo and Williamsville	1	1	150	1	150									3	225
NORTH CAROLINA.																
Total for state		9	20	3,775	18	2,575	2	1,200			2,950	3	297		20	2,655
1	Asheville Electric	3	4	1,000	3	400	1	600			950				2	200
2	Asheville Street Railroad	1	4	275	4	275									3	325
3	Asheville and Craggy Mountain ²															
4	Charlotte Railway, Light and Power	1	2	950	1	350	1	600				2	285		4	480
5	Raleigh Electric	1	4	500	4	500						1	12		3	600
6	Consolidated Railways, Light and Power	1	3	450	3	450									4	450
7	Fries Manufacturing and Power	2	3	600	3	600					2,000				4	600

¹ For details see Supplementary Table 3.
² For details see Supplementary Table 4.
³ Power rented.

⁴ Gas engines.
⁵ Operated by storage batteries.
⁶ Steam power rented.

GENERAL TABLES.

343

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
3	369	3	369								374,125	1,025	498,955	1,367	No.	25	
1	200	1	200								61,152	582	81,536	776	No.	26	
1	264	1	264								474,500	1,300	632,545	1,733	No.	27	
															No.	28	
2	100	2	100								56,817	155	75,756	206	No.	29	
3	400	3	400					2	400	See p. 399.	1,946,545	5,333	2,595,515	7,111	Yes.	30	
6	925	6	925								4,927,500	13,500	6,570,000	18,000	Yes.	31	
4	933	4	933								938,996	2,573	1,251,995	3,431	No.	32	
															No.	33	
1	200	1	200					2	200		295,650	810	394,200	1,080	Yes.	34	
3	400	3	400								415,916	1,139	554,555	1,519	No.	35	
										See p. 402.					No.	36	
3	400	3	400								766,500	2,100	1,022,000	2,800	Yes.	37	
2	333	2	333								255,500	700	340,666	933	No.	38	
10	6,000	6	1,400			4	4,600	11	53,075	See p. 399.	147,088,664	402,964	196,118,219	537,312	No.	39	
										See p. 402.					No.	40	
															No.	41	
															No.	42	
															No.	43	
															No.	44	
															No.	45	
															No.	46	
															No.	47	
															No.	48	
6	1,535	6	1,585								1,898,000	5,200	2,540,545	6,933	No.	49	
7	5,500	4	1,500	2	1,500	1	2,500				12,141,536	33,264	16,188,715	44,352	No.	50	
3	1,000	3	1,000								1,519,568	4,163	2,026,091	5,551	No.	51	
															No.	52	
4	1,400	4	1,400								3,403,384	9,324	4,537,845	12,432	No.	53	
4	1,340	4	1,340					4	26,800	See p. 399.	28,297,875	77,528	37,730,500	103,370	No.	54	
										See p. 402.					No.	55	
33	30,156			23	13,016	10	17,140			See p. 399.	120,864,933	331,137	161,153,244	441,516	No.	56	
18	6,200	17	5,000			1	1,200			See p. 399.	13,235,587	37,096	17,317,558	49,728	No.	57	
										See p. 399.					No.	58	
4	1,750	4	1,750							See p. 399.	7,417,522	20,322	9,890,029	24,096	No.	59	
5	500	5	500								438,000	1,200	584,000	1,600	No.	60	
3	1,350	3	1,350								917,100	2,540	1,222,800	3,387	No.	61	
															No.	62	
															No.	63	
															No.	64	
															No.	65	
1	333	1	333								613,200	1,680	817,600	2,240	No.	66	
2	860	2	860							See p. 399.	1,264,725	3,465	1,686,300	4,620	Yes.	67	
2	433	2	433								821,250	2,250	1,095,000	3,000	No.	68	
										See p. 399.					No.	69	
1	666			1	666						1,119,261	3,066	1,492,348	4,068	Yes.	70	
															No.	71	
2	250	2	250								744,600	2,040	992,800	2,720	No.	72	
7	560	7	560							See p. 399.	1,096,410	3,004	1,461,840	4,005	No.	73	
5	395	5	395					3	500	See p. 399.	364,716	999	466,288	1,332	Yes.	74	
2	500	2	500								410,625	1,125	547,500	1,500	No.	75	
															No.	76	
2	867	1	300	1	567						2,458,240	6,735	3,277,653	8,980	Yes.	77	
4	207	4	207					2	193		638,750	1,750	851,667	2,333	Yes.	78	
3	480	3	480								511,000	1,400	681,333	1,867	Yes.	79	
12	3,746	10	1,500	1	746	1	1,500			See p. 399.	6,000,000	16,712	8,042,895	22,400	No.	80	
3	400	3	400								261,440	1,634	348,640	2,179	No.	81	
1	210	1	210					2	800	See p. 399.	2,007,500	5,500	2,676,910	7,334	No.	82	
2	266	2	266								251,600	1,480	335,410	1,973	No.	83	
1	30	1	30												No.	84	
1	30	1	30					5	1,184	See p. 399.	11,597,928	32,216	15,463,904	42,968	Yes.	85	
										See p. 402.					No.	86	
															No.	87	
6	5,400	3	1,500	1	900	2	3,000			See p. 399.	7,200,000	20,000	10,037,500	27,500	No.	88	
3	1,300	2	600	1	700						1,078,407	2,955	1,437,876	3,940	No.	89	
2	1,000	2	1,000								680,075	1,863	906,767	2,484	Yes.	90	
16	1,675	9	1,110	1	565					See p. 399.	5,708,125	15,625	7,604,167	20,833	No.	91	
4	667	4	667								903,375	2,475	1,204,500	3,300	No.	92	
2	534	2	534								657,000	1,800	876,000	2,400	No.	93	
2	200	2	200								203,000	556	270,667	741	No.	94	
4	1,030	4	1,030								663,498	1,818	884,664	2,424	No.	95	
1	100	1	100								67,820	188	91,615	251	Yes.	96	
															No.	97	
19	2,820	19	2,820					11	4,036	See p. 399.	104,419,748	12,109	105,893,111	16,145	No.	98	
										See p. 402.					No.	99	
2	650	2	650					2	530	See p. 399.	185,274	508	247,032	677	Yes.	1	
3	290	3	290							See p. 402.	492,750	1,350	657,000	1,800	Yes.	2	
															No.	3	
5	910	5	910					4	490	See p. 399.	912,464	2,499	1,216,619	3,332	Yes.	4	
3	370	3	370					1	425		600,000	1,644	800,000	2,192	Yes.	5	
4	300	4	300								485,000	1,329	646,780	1,772	Yes.	6	
2	300	2	300					4	2,600	See p. 402.	1,744,260	4,779	2,325,690	6,372	Yes.	7	

¹ For 11 months only.² For 5½ months only; power rented during remainder of year.³ For lighting purposes only.⁴ For 6 companies only.

TABLE 96.—POWER AND GENERATING

Number	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
OHIO.																
Total for state			90	250	129,830	156	42,160	67	47,070	27	40,600	1,850	8	670	369	97,978
1	Ashtabula Rapid Transit	1	2	250	2	250								2	380	
2	Pennsylvania and Ohio	1	2	1,500			2	1,500						2	1,000	
3	Ohio Central Traction	1	2	500	2	500								2	500	
4	Consolidated	1	2	350	2	350								3	350	
5	Stark Electric	1	2	1,600			2	1,600				2	80	3	1,050	
6	Canton-Akron	4	3	2,800			2	1,400	1	1,400		1	50	6	1,800	
7	Chillicothe Railroad, Light and Power	1	3	700	3	700								7	700	
8	Cincinnati Traction	9	32	19,490	10	1,640	15	10,850	7	7,000				56	15,310	
9	Price Hill Incline Plane	1	4	1,600	4	1,600						1	500	2	2,500	
10	Mill Creek Valley	1	4	2,120	2	520	2	1,600						4	1,600	
11	Cincinnati, Dayton and Toledo	6	9	3,225	7	2,025	2	1,200						15	2,265	
12	Cincinnati, Lawrenceburg and Aurora	1	2	1,300			2	1,300						4	1,000	
13	Cleveland Electric Railway	2	21	16,925	10	2,175	8	5,450	3	9,300				30	10,265	
14	Cleveland City Railway	1	8	9,500	4	2,000			4	7,500				11	5,332	
15	Cleveland, Elyria and Western	2	6	2,800	4	1,300	2	1,500						8	2,300	
16	Eastern Ohio Traction	2	7	2,600	5	1,400	2	1,200						7	2,100	
17	Cleveland, Painesville and Eastern	1	3	1,500	2	700	1	800						4	1,000	
18	Northern Ohio Traction	4	12	5,100	9	2,500	2	1,400	1	1,200				19	2,350	
19	Columbus Railway	2	8	5,750	3	900	3	2,150						19	4,700	
20	Columbus, London and Springfield	2	4	3,250	2	850			2	2,400				10	1,625	
21	Columbus, Buckeye Lake and Newark	1	2	2,500					2	2,500				4	1,400	
22	City Railway	1	5	2,125	5	2,125						1	10	8	1,200	
23	Peoples Railway	1	3	1,800	2	800			1	1,000				7	1,225	
24	Oakwood Street	1	2	600	2	600								3	750	
25	Dayton and Western	1	2	800	2	800								4	1,000	
26	Dayton and Northern	1	2	800	2	800								3	750	
27	Dayton, Springfield and Urbana	2	4	1,900	4	1,900								5	950	
28	Dayton and Troy	2	2	900	2	900								4	1,200	
29	Dayton and Xenia	2	4	1,300	4	1,300								6	2,500	
30	Peoples Gas and Electric	1	2	300	2	300								4	350	
31	Delaware Electric Railway ⁷															
32	United Electric	1	5	465	5	465								5	540	
33	East Liverpool Railway	1	3	1,320	2	600	1	720						6	1,000	
34	Lancaster Traction	1										1,250				
35	Lima Railway and Light ⁷															
36	Western Ohio Railway	1	7	4,025	3	375	2	1,250	2	2,400				8	3,000	
37	Lorain Street Railway	1	4	875	4	875								4	1,000	
38	Mansfield Railway, Light and Power	1	3	1,425	2	675	1	750				1	15	5	1,450	
39	Marion Street Railway ⁷															
40	Mt. Vernon Electric Railway ⁷															
41	Newark and Granville	1	2	275	2	275								3	350	
42	Tuscarawas Traction	1	4	460	4	460								2	500	
43	Ohio River Railway and Power	1	2	500	2	500								2	600	
44	Portsmouth Street Railroad	1	5	600	5	600								8	750	
45	Salem Electric Railway ⁷															
46	Springfield Railway	1	3	900	3	900								4	900	
47	Springfield and Xenia	3	2	700	2	700								2	800	
48	Steubenville and Pleasant Heights ⁷															
49	Steubenville Traction and Light	1	3	1,050	3	1,050								3	816	
50	Electric Railway and Power ⁷															
51	Tiffin, Fostoria and Eastern	1	2	600	2	600						1	5	3	800	
52	Toledo Railways and Light	1	9	8,150			7	4,950	2	3,200				12	5,600	
53	Toledo, Bowling Green and Southern	3	6	1,775	5	1,125	1	650						9	1,550	
54	Toledo, Fostoria and Findlay	1	2	700	2	700						1	10	2	800	
55	Toledo and Western	1	3	2,000	1	500	2	1,500						4	1,040	
56	Lake Shore	4	10	5,600	2	300	8	5,300						11	4,100	
57	Toledo and Maumee Valley	1	1	500	1	500					600			4	480	
58	Wellston and Jackson Belt	1	2	350	2	350								3	450	
59	Worthington, Clintonville and Columbus. ⁷															
60	Youngstown Park and Falls ⁷															
61	Youngstown-Sharon Railway and Light	3														
62	Mahoning Valley	2	8	1,675	8	1,675								5	2,000	
63	Zanesville Electric Railway ⁷															
OREGON.																
Total for state			4	12	4,250	11	3,150			1	1,100		1	50	21	2,900
1	Astoria Electric	1	1	125	1	125								2	150	
2	Portland Railway ⁷	1	12	600	2	600								12	500	
3	City and Suburban	1	6	2,900	5	1,800			1	1,100		1	50	11	1,750	
4	Portland City and Oregon ⁷															
5	Salem Light, Power and Traction	1	3	625	3	625								4	500	
6	Union Street and Suburban ¹⁴															
PENNSYLVANIA.																
Total for state			90	262	137,838	171	44,508	66	50,430	25	42,900	1,200	11	117	440	97,643
1	Lehigh Valley Traction	1	4	3,000			4	3,000						13	3,000	
2	Philadelphia and Lehigh Valley	3	8	1,750	8	1,750								13	2,750	
3	Allentown and Kutztown Traction	1	3	850	3	850								4	600	
4	Altoona and Logan Valley	1	3	1,380	2	600	1	780						6	1,300	
5	Bangor and East Bangor ⁷															
6	Beaver Valley Traction	1	3	1,000	3	1,000								3	900	

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ Includes 2 gas engines of 250 horsepower.⁴ For 51 companies only, and includes 5 companies operating part of year.⁵ For 7 months only.⁶ For 9 months only.⁷ Power rented.⁸ Gas engines.

GENERAL TABLES.

345

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ²		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
272	98,049	226	52,037	27	17,663	19	28,349	50	23,314	See p. 399.....	See p. 402.....	*185,824,282	524,016	*247,449,394	697,919	.....	
2	250	2	250							See p. 399.....	See p. 402.....	788,400	2,160	1,051,200	2,880	No.....	2
2	1,000	2	1,000							See p. 399.....	See p. 402.....	1,576,800	4,320	2,102,400	5,760	No.....	3
2	400	2	400							See p. 399.....	See p. 402.....	123,005	337	163,276	447	Yes.....	4
2	358	2	358							See p. 399.....	See p. 402.....	33,600	92	44,800	123	Yes.....	5
2	81	2	81							See p. 399.....	See p. 402.....	281,050	770	376,607	1,027	Yes.....	6
4	457	4	457							See p. 399.....	See p. 402.....	4,922,000	23,000	6,562,667	30,666	No.....	7
34	18,890	25	10,000	2	1,340	7	7,350			See p. 399.....	See p. 402.....	182,500	500	253,334	667	Yes.....	8
2	500	2	500							See p. 399.....	See p. 402.....	31,111,140	85,236	41,481,520	113,648	No.....	9
4	1,735	2	485	2	1,250					See p. 399.....	See p. 402.....	57,305	157	76,285	209	No.....	10
10	3,427	10	3,427							See p. 399.....	See p. 402.....	131,400	360	175,200	480	No.....	11
2	800	2	800							See p. 399.....	See p. 402.....	7,243,060	19,844	9,219,900	25,260	Yes.....	12
81	11,540	28	8,540			3	8,000			See p. 399.....	See p. 402.....	1,788,500	4,900	2,319,545	6,533	No.....	13
8	7,705	4	1,005			4	6,700			See p. 399.....	See p. 402.....	22,863,774	62,641	30,485,083	83,521	No.....	14
6	2,800	4	1,300	2	1,500					See p. 399.....	See p. 402.....	15,826,400	43,360	21,207,376	58,102	Yes.....	15
6	2,800	3	800	3	2,000			1	415	See p. 399.....	See p. 402.....	4,161,000	11,400	5,548,000	15,200	Yes.....	16
3	1,200	2	533	1	667					See p. 399.....	See p. 402.....	1,571,973	4,306	2,095,964	5,741	Yes.....	17
10	3,862	8	2,263	1	533	1	1,066	3	786	See p. 399.....	See p. 402.....	21,247,380	58,212	28,329,840	77,616	Yes.....	18
8	5,750	3	900	3	2,150	2	2,700			See p. 399.....	See p. 402.....	10,220,000	28,000	13,626,666	37,333	Yes.....	19
2	100	2	100					2	1,600	See p. 399.....	See p. 402.....	3,350,000	9,178	4,490,595	12,303	No.....	20
5	1,675	5	1,675						2,300	See p. 399.....	See p. 402.....	2,295,000	8,500	3,082,666	11,333	No.....	21
3	1,800	2	600			1	1,200			See p. 399.....	See p. 402.....	3,613,500	9,900	4,818,000	13,200	No.....	22
2	500	2	500							See p. 399.....	See p. 402.....	2,188,623	5,996	2,918,184	7,994	Yes.....	23
3	800	3	800							See p. 399.....	See p. 402.....	1,204,500	3,300	1,606,000	4,400	No.....	24
4	2,000	4	2,000							See p. 399.....	See p. 402.....	876,000	2,400	1,168,000	3,200	No.....	25
2	535	2	535					2	666	See p. 399.....	See p. 402.....	574,875	1,575	766,500	2,100	No.....	26
2	900	2	900							See p. 399.....	See p. 402.....	908,680	2,490	1,211,573	3,320	No.....	27
3	162	3	162					1	200	See p. 399.....	See p. 402.....	986,960	2,704	1,315,825	3,605	No.....	28
3	182	3	182							See p. 399.....	See p. 402.....	1,266,550	3,470	1,688,490	4,626	Yes.....	29
3	1,260	3	341	1	700			4	198	See p. 399.....	See p. 402.....	178,850	490	238,466	653	No.....	30
3	200	3	200							See p. 399.....	See p. 402.....	204,984	562	273,312	749	Yes.....	31
5	1,000	5	1,000							See p. 399.....	See p. 402.....	1,791,420	4,908	2,388,560	6,544	Yes.....	32
4	1,300	4	1,300							See p. 399.....	See p. 402.....	195,275	535	260,700	714	No.....	33
3	200	3	200					4	3,120	See p. 399.....	See p. 402.....	2,556,945	7,005	3,409,260	9,340	No.....	34
5	1,000	5	1,000					3	1,629	See p. 399.....	See p. 402.....	1,537,862	4,213	2,050,483	5,618	No.....	35
2	250	2	250							See p. 399.....	See p. 402.....	929,655	2,547	1,239,540	3,396	No.....	36
6	660	6	660					1	120	See p. 399.....	See p. 402.....	10,575,140	2,256	10,766,853	2,975	No.....	37
6	600	6	600							See p. 399.....	See p. 402.....	1,204,500	3,300	1,606,000	4,400	Yes.....	38
6	350	6	350					2	300	See p. 399.....	See p. 402.....	438,000	1,200	584,000	1,600	Yes.....	39
1	80	1	80							See p. 399.....	See p. 402.....	693,500	1,900	924,667	2,533	Yes.....	40
3	975	3	975							See p. 399.....	See p. 402.....	1,849,106	5,066	2,465,474	6,754	No.....	41
2	733	2	733					2	800	See p. 399.....	See p. 402.....	11,654,075	4,275	11,872,100	5,700	No.....	42
2	1,146	2	1,146							See p. 399.....	See p. 402.....	779,440	2,135	1,045,900	2,847	No.....	43
29	7,823	25	4,490	2	1,146	1	1,333			See p. 399.....	See p. 402.....	554,283	1,519	639,044	2,024	Yes.....	44
6	1,006	6	1,006					3	1,067	See p. 399.....	See p. 402.....	10,133,893	27,764	13,511,857	37,018	Yes.....	45
6	660	6	660					3	720	See p. 399.....	See p. 402.....	1,263,447	3,461	1,684,596	4,615	Yes.....	46
6	96	6	96							See p. 399.....	See p. 402.....	470,850	1,290	627,800	1,720	Yes.....	47
6	2,500	2	300	4	2,200			3	1,920	See p. 399.....	See p. 402.....	1,314,000	3,600	1,752,000	4,800	No.....	48
2	800	2	800					4	2,750	See p. 399.....	See p. 402.....	8,030,000	22,000	10,706,666	29,333	No.....	49
2	533	2	533					1	80	See p. 399.....	See p. 402.....	638,750	1,750	851,667	2,334	Yes.....	50
										See p. 399.....	See p. 402.....	1,418,332	3,932	1,901,253	5,208	No.....	51
										See p. 399.....	See p. 402.....					No.....	52
11	1,550	11	1,550							See p. 399.....	See p. 402.....	7,018,000	19,200	9,398,750	25,750	No.....	53
										See p. 399.....	See p. 402.....					No.....	54
15	3,415	13	1,715	1	600	1	1,100	4	1,000	See p. 400.....	See p. 402.....	12,144,692	19,574	12,952,135	26,099	.....	
1	100	1	100							See p. 400.....	See p. 402.....	438,000	1,200	584,000	1,600	No.....	1
8	2,940	6	1,240	1	600	1	1,100	1	600	See p. 400.....	See p. 402.....	5,881,245	16,113	7,841,660	21,484	No.....	2
6	375	6	375					3	400	See p. 400.....	See p. 402.....	825,447	2,261	1,100,475	3,015	Yes.....	3
										See p. 400.....	See p. 402.....					No.....	4
265	121,468	179	39,133	61	43,894	25	38,441	13	6,443	See p. 400.....	See p. 402.....	16,209,885,945	743,610	16,361,188,585	994,227	.....	
4	3,000			4	3,000					See p. 400.....	See p. 402.....	5,539,600	15,177	7,425,745	20,345	Yes.....	1
8	1,873	8	1,873							See p. 400.....	See p. 402.....	909,640	2,492	1,219,356	3,340	No.....	2
3	565	3	565							See p. 400.....	See p. 402.....	774,536	2,122	1,032,585	2,829	No.....	3
3	1,380	2	600	1	780					See p. 400.....	See p. 402.....	2,642,952	7,241	3,523,938	9,634	No.....	4
131	133	1	133							See p. 400.....	See p. 402.....	2,737,500	7,600	3,650,000	10,000	No.....	5
3	1,000	3	1,000							See p. 400.....	See p. 402.....	2,737,500	7,600	3,650,000	10,000	Yes.....	6

¹ For 10 months only.

² For 84 months only.

³ For 5 months only.

⁴ For 3 companies only.

⁵ Owned, but not operated.

⁶ Operated by steam locomotive.

⁷ Includes 3 gas engines of 1,000 horsepower.

⁸ For 51 companies only, and includes 4 companies operating part of year.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, number.	STEAM ENGINES.								WATER-POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
PENNSYLVANIA—Continued.																
7	Riverview Electric Street Railway ²															
8	Patterson Heights Street Railway ²															
9	Columbia and Montour	1	2	600	2	600									4	1,400
10	Bradford Electric Street Railway ²															
11	Butler Passenger Railway ²															
12	Carlisle and Mt. Holly ²															
13	Cumberland Valley Traction	1	3	800	3	800									3	450
14	Chester Traction	1	6	2,775	4	925	1	650	1	1,200					11	1,900
15	Media, Middletown, Aston and Chester	2	1	300	1	300									2	500
16	Philadelphia and Chester Railway ²															
17	Connellsville Suburban ²															
18	Newtown Electric Street Railway	1	5	950	5	950									5	800
19	Doylestown and Easton	1	1	125	1	125									1	125
20	Doylestown and Willow Grove	1	2	400	2	400									2	500
21	Dubois Traction ²															
22	Easton and Nazareth	1	2	900	2	900									3	750
23	Erie Electric Motor	1	4	850	4	850									6	900
24	Erie Traction	1	2	1,200			2	1,200							6	1,200
25	Erie Rapid Transit	1	2	700	2	700									2	500
26	Franklin Electric Street Railway ²															
27	Gettysburg Transit ²															
28	Hanover and McSherrystown ²															
29	Lehigh Traction	1	4	850	4	850						1	7		6	1,000
30	Harrisburg Traction	2	5	1,650	5	1,650									10	1,400
31	Harrisburg and Mechanicsburg ²															
32	Cambria Incline Plane	1	1	600			1	600							3	750
33	Johnstown Passenger Railway	1	2	1,500			2	1,500							4	1,268
34	Kittanning and Ford City ²															
35	Conestoga Traction	2	8	1,825	8	1,825									14	1,850
36	Lebanon Valley ²		42	715	2	715									43	750
37	Lewistown and Reedsville	1	2	400	2	400									3	650
38	Susquehanna Traction	1	2	200	2	200									2	220
39	Lykens and Williams Valley	1	2	300	2	300									2	300
40	Highland Grove ²															
41	Schuylkill Traction	2	5	1,300	5	1,300									7	1,200
42	Mauch Chunk, Lehigh and Slatington.	2	1	250	1	250					200				1	300
43	Meadville Traction	1	2	250	2	250									2	250
44	Lewisburg, Milton and Watsonstown ²		41	425	1	425									41	200
45	Montoursville Passenger ²															
46	New Castle Traction ²															
47	New Castle and Lowell	1	3	750	3	750									2	800
48	Schuylkill Valley Traction	3	5	2,600	4	1,350			1	1,250					9	1,590
49	Lansdale and Norristown	1	2	600	2	600									3	600
50	Peoples Street Railway	1	2	500	2	500									2	500
51	Citizens Traction		2	300	2	300					400				2	500
52	Oil City Street Railway ²															
53	Union Traction	8	42	48,950	10	4,000	11	7,150	21	37,800			8	80	110	30,000
54	Southwestern Street Railway	1	2	600	2	600									4	600
55	Philadelphia, Bristol and Trenton	1	2	400	2	400									3	400
56	Philadelphia and West Chester Traction	2	2	1,200			2	1,200							3	1,250
57	Holmesburg, Tacony and Frankford	1	4	1,400	4	1,400									4	980
58	Fairmount Park Transportation	1	3	2,250			3	2,250				1	10		6	1,500
59	Delaware County and Philadelphia	1	1	500	1	500									4	530
60	Montgomery and Chester ²															
61	Pittsburg Railways	7	47	33,000	14	4,700	33	28,300							60	16,500
62	St. Clair Incline Plane	1	1	50	1	50									3	125
63	Duquesne Incline Plane	1	2	200	2	200									2	250
64	Pittsburg and Castle Shannon	1	3	225	3	225									4	300
65	Monongahela Incline Plane	1	2	600	2	600									5	500
66	Penn Incline Plane	1	2	450	2	450									4	340
67	Pittsburg, McKeesport and Greensburg ²	1														
68	Pittsburg, McKeesport and Connellsville	4	8	1,220	8	1,220									10	1,250
69	Pottstown Passenger Railway ²															
70	Ringling Rocks Electric	1	2	300	2	300									2	350
71	Pottsville Union Traction	1	3	1,500	3	1,500									6	1,500
72	Punxsutawney Street Railway	1	2	300	2	300									3	375
73	United Traction	2	4	2,900	1	350	2	1,300	1	1,250					(10)	
74	Waverly, Sayre and Athens ²	1														
75	Neversink Mountain Railroad ²															
76	Mt. Penn Gravity Railway ²															
77	Scranton Railway	2	9	3,588	7	1,448	1	750	1	1,400					12	3,690
78	Shamokin and Mt. Carmel	1	3	900	3	900									6	750
79	Shamokin and Edgewood ²															
80	Stroudsburg Passenger ²															
81	Sunbury and Northumberland	1	1	100	1	100									1	100
82	Tamaqua and Lansford	1	2	650	2	650									2	500
83	Tarantum Traction Passenger	1	2	200	2	200									2	250
84	Titusville Electric Traction	1	2	750	1	200	1	550				1	20		3	450
85	Warren Street Railway	1									600					
86	Washington Electric Railway ²															
87	West Chester Street Railway ²															
88	Wilkesbarre and Wyoming Valley	2	7	2,400	5	1,200	2	1,200							18	2,700
89	Wilkesbarre, Dallas and Harveys Lake	1	2	600	2	600									3	750
90	Vallamont Traction ²															
91	South Side Passenger Railway ²															
92	Williamsport Passenger Railway ²															
93	East End Passenger Railway ²															
94	Red Lion and Windsor ²	1														
95	Yardley, Morrisville and Trenton ²															
96	York and Dover Electric ²															
97	York and Dallastown Electric ²															
98	York Street Railway ²															

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ Power rented.⁴ Owned, but not operated.⁵ For 1 month only.⁶ For 10 months only.

347

DIRECT-CURRENT DYNAMOS.							ALTERNATING-CURRENT DYNAMOS. ^a		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generator electric current for sale.	Number.	
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.			H. P.	Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.			Average per day.
2	533	2	533					2	533	See p. 400.	See p. 402.	801,175	2,195	1,088,233	2,927	No.	7
*1	250	1	250													No.	8
3	775	3	775									993,165	2,721	1,324,220	3,628	No.	9
6	2,491	4	825	1	600	1	1,066			See p. 400.		5,183,730	14,202	6,911,640	17,936	No.	10
2	300	2	300									1,927,200	5,280	2,569,600	7,040	No.	11
1	400	1	400					2	250		See p. 402.	1,418,025	3,885	1,890,700	5,180	Yes	12
1	133	1	133									*36,000	1,125	*48,000	1,500	No.	13
2	380	2	380									394,200	1,080	525,600	1,440	No.	14
2	800	2	800									542,025	1,485	722,700	1,980	Yes	15
8	800	8	800									2,737,500	7,500	3,650,000	10,000	No.	16
2	1,200	2	335	2	1,200							919,800	2,520	1,226,400	3,360	No.	17
2	335	2	335									*202,400	670	*270,000	892	No.	18
*2	300	2	300													No.	19
4	860	4	860									985,500	2,700	1,314,000	3,600	Yes	20
7	1,702	7	1,702							See p. 400.	See p. 402.	4,380,000	12,000	5,840,000	16,000	Yes	21
2	1,334			2	1,334							3,321,500	9,100	4,428,667	12,133	No.	22
9	1,320	9	1,320					1	400	See p. 400.	See p. 402.	4,380,000	12,000	5,840,000	16,000	No.	23
*2	734	2	734									234,330	642	312,440	856	No.	24
2	400	2	400									165,710	454	220,825	605	No.	25
2	200	2	200									219,000	600	292,000	800	No.	26
2	300	2	300									2,920,000	8,000	3,893,455	10,667	No.	27
4	1,200	4	1,200									1,643,595	4,503	2,191,460	6,004	No.	28
3	450	3	450									370,735	1,015	496,765	1,361	No.	29
2	300	2	300							See p. 400.						No.	30
*1	180	1	180													No.	31
3	660	3	660									1,411,000	3,900	1,548,000	4,020	No.	32
5	2,200	4	1,125			1	1,075			See p. 400.		4,019,015	11,011	5,358,687	14,681	Yes	33
2	600	2	600									*192,421	1,718	*256,561	2,291	No.	34
2	267	2	267							See p. 400.		327,992	899	427,323	1,199	No.	35
2	470	2	470									694,960	1,904	926,613	2,538	No.	36
40																	

¹⁰ Steam rented.

STREET AND ELECTRIC RAILWAYS.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
RHODE ISLAND.																
	Total for state	9	22	13,135	10	2,285	7	4,650	5	6,200					44	8,430
1	Sea View Railroad	2	4	635	4	635									4	650
2	Fawtucket Street Railway ⁴	1	6	6,450			3	2,250	3	4,200					12	3,000
3	Union Railroad	3	6	2,900	2	500	4	2,400							9	2,175
4	Rhode Island Suburban	1	3	800	3	800									6	865
5	Providence and Danielson	1	2	2,000					2	2,000					10	1,500
6	New York, New Haven and Hartford	1	1	350	1	350									3	240
7	Fawcattuck Valley Railway															
8	Woonsocket Street Railway ⁴															
SOUTH CAROLINA.																
	Total for state	3	14	5,875	11	3,525	3	2,350							12	4,050
1	North Augusta Electric and Improve- ment.															
2	Charleston Railway, Gas and Electric	2	10	5,100	7	2,750	3	2,350							10	3,650
3	Columbia Railway, Light and Power ⁴															
4	Greenville Traction ⁴															
5	Orangeburg City Street Railway															
6	Rock Hill Water, Light and Railway															
7	Spartanburg Railway, Gas and Electric	1	4	775	4	775									2	400
SOUTH DAKOTA.																
	Total for state															
1	Rapid City Street Railway ⁷															
TENNESSEE.																
	Total for state	6	21	11,172	12	2,972	6	8,800	3	4,400		7	310		30	7,900
1	Bristol Belt Line ⁴															
2	Chattanooga Electric Railway	1	5	910	5	910									4	500
3	Rapid Transit of Chattanooga	1	3	1,750	2	950	1	800							5	1,200
4	Electric Railway, of Clarksville	1	2	300	2	300									2	200
5	Jackson and Suburban	1	2	312	2	312									4	400
6	Knoxville Traction	1	5	3,000			5	3,000							8	2,800
7	Memphis Street Railway	1	4	4,900	1	500			3	4,400		7	310		7	2,800
8	Nashville Railway ⁴															
TEXAS.																
	Total for state	9	22	7,115	19	4,565	1	550	2	2,000		8	265		27	5,800
1	Austin Electric Railway	1	2	500	2	500									2	350
2	Bonham Electric Railway, Light and Power. ⁴															
3	Dallas Consolidated ⁴															
4	Rapid Transit ⁴															
5	Denison and Sherman	1	2	600	2	600									2	500
6	El Paso Electric Railway ⁴															
7	Northern Texas Traction	2	3	2,350	1	350			2	2,000		3	180		6	1,800
8	Galveston Street Railway	1	6	1,600	6	1,600						5	85		3	750
9	Houston Electric	1	2	540	2	540									3	500
10	Laredo Electric and Railway	1	1	50	1	50									1	200
11	Longview and Junction															
12	Paris Transit ⁴															
13	San Antonio Traction	1	3	850	2	300	1	550							6	1,000
14	Seguin Street Railway															
15	Citizens Railway	1	3	625	3	625									4	700
16	Waxahachie Street Railway															
17	Lake Park Street Railroad															
UTAH.																
	Total for state	1	4	900	4	900									8	950
1	Ogden Rapid Transit	1	1	400	1	400									3	450
2	Consolidated Railway and Power ⁴		11	500	3	500									11	500
3	Salt Lake and Utah Valley ⁴															
VERMONT.																
	Total for state	3	5	1,011	5	1,011					140				6	900
1	Barre and Montpelier ⁴															
2	Bellows Falls and Saxtons River ⁴															
3	Brattleboro Street Railway	1	2	275	2	275					140				2	200
4	Burlington Traction ⁴															
5	Rutland Street Railway ⁴															
6	St. Albans Street Railway	1	1	286	1	286									2	400
7	Springfield Electric Railway ⁴															
8	Mt. Mansfield Electric Railway	1	2	450	2	450									2	300
9	Military Post Railway ⁴															

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ For 6 companies only, and includes 1 company operating part of year.⁴ Power rented.⁵ For 6 months only.⁶ For 2 companies only.

GENERAL TABLES.

349

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
29	12,044	18	2,414	7	4,741	4	4,889			See p. 400.	See p. 408.	* 35,576,992	97,591	* 47,460,356	130,189		
6	579	6	579							See p. 400.	See p. 408.	766,500	2,100	1,022,000	2,800	Yes	1
6	5,750			3	2,000	8	3,750			See p. 400.	See p. 408.	22,269,745	61,013	29,692,993	81,351	No	2
8	1,901	7	1,035	1	866					See p. 400.	See p. 408.	8,074,165	22,121	10,765,553	29,495	Yes	3
3	935	2	400	1	535	1	1,139			See p. 400.	See p. 408.	1,007,765	2,761	1,343,665	3,681	No	4
3	2,479			2	1,340							3,411,317	9,846	4,572,811	12,528	No	5
3	400	3	400									* 47,500	250	* 63,334	334	No	6
																No	7
8	2,817	7	2,117	1	700			8	1,590	See p. 400.	See p. 408.	* 5,652,469	15,483	* 7,537,112	20,645		
																No	1
6	2,467	5	1,767	1	700			6	1,270	See p. 400.	See p. 408.	4,668,429	12,787	6,224,572	17,049	Yes	2
										See p. 400.	See p. 408.					No	3
																No	4
																No	5
2	350	2	350					2	320			984,040	2,696	1,312,540	3,596	Yes	6
																No	7
																	1
32	8,663	28	4,263	1	800	3	3,600	3	1,183	See p. 400.		* 12,570,235	34,439	* 16,821,390	46,066		
7	900	7	900									2,117,000	5,800	2,883,500	7,900	No	1
3	1,750	2	950	1	800					See p. 400.		2,365,200	6,480	3,153,600	8,640	No	2
2	150	2	150									136,510	374	182,135	499	No	3
2	163	2	163					1	117			1,096,000	3,000	1,460,000	4,000	Yes	4
14	1,700	14	1,700					2	1,066			2,980,225	8,165	3,973,755	10,887	Yes	5
4	4,000	1	400			3	3,600			See p. 400.		3,876,300	10,620	5,168,400	14,160	No	6
																No	7
																No	8
27	4,904	26	4,337	1	567			4	2,173	See p. 400.	See p. 408.	* 10,575,319	30,983	* 14,107,849	41,330		
3	500	3	500									1,120,000	3,068	1,500,880	4,112	No	1
																No	2
																No	3
2	500	2	500									511,900	1,400	681,333	1,866	No	4
																No	5
4	650	4	650					2	1,740	See p. 400.	See p. 408.	1,460,000	4,000	1,946,545	5,333	Yes	6
2	870	2	870					2	433			* 324,800	2,900	* 433,066	3,866	Yes	7
5	640	5	640									2,323,580	6,366	3,093,120	8,488	No	8
2	150	2	150							See p. 400.		167,680	432	210,240	576	Yes	9
																No	10
5	1,047	4	480	1	567							3,790,204	10,384	5,058,605	13,845	No	11
4	547	4	547									888,045	2,433	1,184,066	3,244	No	12
																No	13
10	1,030	10	1,030									556,625	1,525	742,166	2,033	Yes	14
3	260	3	260									556,625	1,525	742,166	2,033	No	15
117	770	7	770													No	16
																No	17
10	2,173	10	2,173							See p. 400.	See p. 408.	¹² 1,804,196	4,943	¹² 2,405,350	6,590		
										See p. 400.	See p. 408.					No	1
2	347	2	347							See p. 400.	See p. 408.	365,000	1,000	486,545	1,333	No	2
111	333	1	333													No	3
																No	4
1	280	1	280							See p. 400.		542,025	1,485	722,700	1,980	No	5
112	600	2	600									897,170	2,458	1,196,105	3,277	No	6
2	400	2	400													No	7
112	213	2	213													No	8

¹ This company failed to make a report.

² For 6 companies only.

³ For 8 companies only, and includes 1 company operating part of year.

¹⁰ For 4 months only; power rented during remainder of year.

¹¹ Owned but not operated.

¹² For 3 companies only.

STREET AND ELECTRIC RAILWAYS.

TABLE 96.—POWER AND GENERATING

Number.	STATE AND NAME OF COMPANY.	Power houses, num- ber.	STEAM ENGINES.								WATER- POWER. ¹	AUXILIARY STEAM ENGINES.		BOILERS.		
			Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.			H. P.	No.	H. P.	No.	H. P.
			No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.						
VIRGINIA.																
Total for state		16	51	15,820	45	10,245	3	2,250	3	3,325	950	2	40	51	9,880	
1	Charlottesville City and Suburban	1	3	450	3	450								2	300	
2	Danville Railway and Electric	1	2	450	2	450								2	400	
3	Washington, Arlington and Falls Church. ⁴															
4	Lynchburg Traction and Light	2	5	1,275	5	1,275					350			4	1,000	
5	Citizens Railway, Light and Power ⁴	1	4	400	4	400								3	550	
6	Newport News and Old Point Railway and Electric.	1	6	3,475	4	1,600	1	750	1	1,125				6	1,500	
7	Bay Shore Terminal	1	1	300	1	300								4	300	
8	Norfolk and Atlantic Terminal	1	2	600	2	600								4	600	
9	Berkley Street Railway	1	2	300	2	300										
10	Norfolk Railway and Light	1	9	4,300	7	2,100			2	2,200				(7)	2,500	
11	Southside Railway and Development ⁵															
12	Richmond and Petersburg Electric ⁴	1	2	300	2	300								2	200	
13	Old Dominion Railway	1	4	900	4	900								4	550	
14	Norfolk, Portsmouth and Newport News. Radford Water Power.	1									600					
15	Richmond Traction															
16	Richmond Passenger and Power ⁵															
17	Virginia Passenger and Power ⁵															
18	Roanoke Railway and Electric	1	7	1,350	7	1,350						2	40	3	900	
19	Tazewell Street Railway															
20	Washington, Alexandria and Mt. Vernon	2	4	1,720	2	220	2	1,500						8	1,080	
WASHINGTON.																
Total for state		9	34	13,132	26	6,182	5	3,450	3	3,500	1,325	3	35	66	10,855	
1	Everett Railway and Electric	1	2	1,500			2	1,500			1,325	3	35	3	960	
2	Olympia Light and Power	1														
3	Seattle Electric	4	20	5,382	19	4,782	1	600						41	4,855	
4	Seattle and Renton ⁴															
5	Washington Water Power ⁴															
6	Spokane and Montrose Motor ⁴															
7	Tacoma Railway and Power	2	7	5,200	3	950	1	750	3	3,500				16	4,040	
8	Northern Railway and Improvement	1	5	1,050	4	450	1	600						6	1,000	
WEST VIRGINIA.																
Total for state		9	34	12,050	26	5,500	5	3,350	3	3,200				45	8,300	
1	Kanawha Valley Traction ⁴															
2	East Liverpool and Rock Springs ⁴															
3	Fairmont and Clarksburg	2	7	1,900	6	1,100	1	800						13	1,600	
4	Camden Interstate Railway	1	3	1,800			3	1,800						4	1,550	
5	Parkersburg, Marietta and Interurban	2	12	3,000	12	3,000								17	2,300	
6	Wheeling and Wellsburg	1	2	200	2	200								1	100	
7	Wheeling Traction	2	6	3,750	3	550			3	3,200				7	1,950	
8	Wheeling and Elm Grove	1	4	1,400	3	650	1	750						3	800	
WISCONSIN.																
Total for state		21	71	36,530	48	11,680	12	7,650	11	17,200	3,885			93	24,616	
1	Wisconsin Traction, Lt., Heat and Power	1	2	2,000					2	2,000	3,200			6	2,000	
2	Ashland Light, Power and Street Railway	1	4	500	4	500								4	500	
3	Chippewa Valley Electric Railroad	2	1	300	1	300								1	300	
4	Fond du Lac Street Railway and Light	1	5	1,100	5	1,100								5	900	
5	Fox River Electric Railway and Power	1	3	450	3	450								2	596	
6	Janesville Street Railway	1	1	100	1	100								2	170	
7	La Crosse City Railway	1	2	650	2	650								3	400	
8	La Crosse and Onalaska ⁴															
9	Madison Traction ⁴															
10	Manitowoc and Northern	1	1	300	1	300								2	300	
11	Marquette Gas, Electric Light and Street Railway.	1	3	700	3	700								4	350	
12	Merrill Railway and Lighting	1	1	200	1	200					475			4	550	
13	Milwaukee Electric Railway and Light	4	31	22,840	15	3,590	7	4,050	9	15,200				40	13,400	
14	Milwaukee Light, Heat and Traction	3	10	3,325	9	2,725	1	600						10	2,050	
15	Winnebago Traction	1	3	2,250			3	2,250						3	2,100	
16	Sheboygan Light, Power and Railway	1	3	1,630	2	900	1	750						5	800	
17	Waupaca Electric Light and Railway	1	1	165	1	165					210			2	200	
HAWAII.																
Total for territory		2	4	1,120	4	1,120						1	60	4	930	
1	Hawaiian Tramways															
2	Honolulu Rapid Transit and Land	1	3	1,020	3	1,020						1	60	3	780	
3	Pacific Heights Electric Railway ⁴	1	1	100	1	100								1	150	
PORTO RICO.																
Total		1	4	700	4	700								3	725	
1	Tramway Stock															
2	San Juan Light and Transit	1	4	700	4	700								3	725	

¹ For details see Supplementary Table 3.² For details see Supplementary Table 4.³ For 13 companies only, and includes 2 companies operating part of year.⁴ Power rented.⁵ Used for lighting purposes only.⁶ For 1½ months only.⁷ Steam rented.⁸ For 3 months.

GENERAL TABLES.

351

PLANTS, BY COMPANIES: 1902—Continued.

DIRECT-CURRENT DYNAMOS.								ALTERNATING-CURRENT DYNAMOS. ¹		Auxiliary equipment, transformers, storage batteries, rotaries, etc.	Substations and their equipment.	OUTPUT OF STATIONS.				Generate electric current for sale.	Number.
Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and over.		No.	H. P.			Kilowatt hours.		Horsepower hours of current.			
No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.					Total for year.	Average per day.	Total for year.	Average per day.		
59	12,934	54	8,567	3	2,167	2	2,200	17	3,555	See p. 400.	See p. 403.	¹⁸ 18,833,300	53,567	²⁵ 25,386,755	71,630	.....	
5	550	5	550							See p. 400.		328,500	900	438,000	1,200	Yes	1
5	680	5	680									735,183	2,014	965,500	2,700	Yes	2
																No	3
4	875	4	875					5	775			2,826,925	7,745	3,769,233	10,327	Yes	4
⁴² 2	200	2	200					⁴¹ 1	50							Yes	5
2	1,100	1	433	1	667			5	1,900	See p. 400.	See p. 403.	1,722,528	4,719	2,496,671	6,292	Yes	6
1	267	1	267									⁴⁶ 46,800	1,200	⁴⁶ 46,400	1,600	No	7
2	606	2	606									848,625	2,325	1,137,567	3,116	No	8
2	300	2	300									¹¹⁰ 110,400	1,200	¹⁴⁷ 147,200	1,600	No	9
13	4,300	11	2,100			2	2,200	3	500	See p. 400.		6,737,279	18,458	9,026,450	24,730	Yes	10
										See p. 400.						No	11
2	268	2	268									452,600	1,240	605,900	1,660	No	12
4	804	4	804									620,500	1,700	831,762	2,278	No	13
1	160	1	160					2	280	See p. 400.		332,750	912	443,667	1,216	Yes	14
																No	15
																No	16
																Yes	17
12	1,030	12	1,030					1	50			1,971,000	5,400	2,642,125	7,238	Yes	18
4	1,800	2	300	2	1,500							2,100,210	5,754	2,800,280	7,673	Yes	19
																No	20
																Yes	21
67	7,651	66	7,017	1	634			13	5,252	See p. 400.	See p. 403.	¹⁹ 20,649,562	56,574	¹⁰ 27,532,749	75,432	.....	
1	634			1	634			1	634	See p. 400.		472,959	1,296	630,612	1,728	Yes	1
3	368	3	368					3	348	See p. 400.		427,008	1,170	569,344	1,560	Yes	2
51	4,068	51	4,068					5	660	See p. 400.	See p. 403.	10,200,000	27,945	13,600,000	37,260	Yes	3
																No	4
																No	5
																No	6
7	1,675	7	1,675					3	3,450	See p. 400.		7,634,615	20,917	10,179,487	27,889	Yes	7
5	906	5	906					1	160	See p. 400.		1,914,980	5,246	2,553,306	6,995	Yes	8
22	6,117	17	2,834	5	3,283			14	3,923	See p. 400.	See p. 403.	¹¹ 11,744,495	32,178	¹¹ 15,659,861	42,903	.....	
																No	1
5	1,058	4	525	1	533			4	653			1,204,500	3,300	1,606,000	4,400	No	2
								3	1,800	See p. 400.	See p. 403.	6,074,330	16,642	8,099,107	22,189	Yes	3
7	1,093	7	1,093					5	1,260			2,179,050	5,970	2,905,400	7,960	Yes	4
2	266	2	266									81,500	223	108,667	297	No	5
5	2,350	2	350	3	2,000							¹² 2,205,515	6,043	¹² 2,940,687	8,057	No	6
3	1,350	2	600	1	750			2	210							Yes	7
121	23,483	112	15,633	6	3,650	3	4,200	30	14,696	See p. 400.	See p. 403.	¹⁴ 45,177,222	124,102	¹³ 60,236,054	165,469	.....	
2	1,500			2	1,500			2	1,600			¹⁴ 1,013,970	2,778	¹⁴ 1,351,960	3,704	Yes	1
5	260	5	260					3	320			985,500	2,700	1,314,000	3,600	Yes	2
1	400	1	400							See p. 400.	See p. 403.	1,865,880	5,112	2,487,840	6,816	No	3
8	795	8	795					3	350			864,721	2,369	1,162,670	3,158	Yes	4
5	520	5	520									744,600	2,040	992,800	2,720	Yes	5
1	120	1	120							See p. 400.		256,960	704	342,613	939	No	6
3	600	3	600									603,345	1,653	804,460	2,204	Yes	7
																No	8
																No	9
1	500	1	500									¹⁵ 245,000	1,000	¹⁵ 326,667	1,333	Yes	10
6	240	6	240					3	350			1,028,570	2,818	1,371,427	3,757	Yes	11
5	500	5	500							See p. 400.		300,000	822	400,000	1,096	Yes	12
59	13,750	52	7,400	4	2,150	3	4,200	10	10,720	See p. 400.	See p. 403.	31,526,259	86,373	42,035,012	115,164	Yes	13
16	2,402	16	2,402					2	706			2,888,847	7,915	3,851,845	10,553	Yes	14
2	600	2	600					1	300			1,331,885	3,649	1,775,847	4,866	No	15
5	1,044	5	1,044					5	250			1,226,400	3,360	1,635,200	4,480	Yes	16
2	252	2	252					1	100			295,285	809	398,713	1,079	Yes	17
4	500	4	500					1	75								
																No	1
3	400	3	400									(⁹)		(⁹)		Yes	2
¹⁶¹ 1	100	¹⁶¹ 1	100					¹⁶¹ 1	75							No	3
2	600	2	600					2	600			1,044,995	2,863	1,393,205	3,817	.....	
2	600	2	600					2	600			1,044,995	2,863	1,398,205	3,817	No	1
																Yes	2

¹Not reported.²For 5 companies only.³For 5 companies only, and includes 1 company operating part of year.⁴For 10 months only.¹⁸For 15 companies only, and includes 2 companies operating part of year.¹⁹For 9 months only.²⁰For 8 months only.²¹Owned but not operated.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS,

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
	UNITED STATES.....	5,836,615,296	14,774,211,904	1,062,403,392	4,455	212,217	1,144,430,466	1,120,101,944	24,328,522	4.26
	ALABAMA.									
	Total for state	23,741,963	22,748,871	993,092	12	111,122	6,152,896	6,043,479	109,417	3.76
1	Anniston Electric and Gas	814,388	780,200	34,188	3	78,020	316,095	313,380	2,715	2.49
2	Birmingham Railway, Light and Power	13,298,538	13,014,354	284,184	4	118,312	2,686,682	2,626,480	60,202	4.96
3	Decatur Street Railway	194,647	194,647	.....	.....	64,240	91,970	91,970	.....	2.12
4	Alabama City, Gadsden and Attalla	400,000	400,000	.....	.....	59,701	150,000	130,000	20,000	3.08
5	Huntsville Railway, Light and Power	385,274	385,274	.....	.....	83,393	209,800	209,800	.....	1.84
6	Mobile Light and Railroad	6,226,037	5,672,192	553,845	2	151,258	1,465,125	1,463,625	1,500	3.88
7	Montgomery Street Railway	1,921,395	1,849,395	72,000	1	92,470	988,800	988,800	.....	1.87
8	Selma Street and Suburban	441,684	392,809	48,875	2	66,918	194,424	194,424	.....	2.02
9	Tuscaloosa Belt Railway	60,000	60,000	.....	.....	8,571	50,000	25,000	25,000	2.40
	ARIZONA.									
	Total for territory	799,710	797,970	1,740	2	46,665	306,600	306,600	.....	2.60
1	Phoenix Railway	4750,000	750,000	.....	.....	62,500	255,500	255,500	.....	2.94
2	Tucson Street Railway	49,710	47,970	1,740	2	9,406	51,100	51,100	.....	.94
	ARKANSAS.									
	Total for state	67,835,569	6,880,479	955,090	11	131,082	2,144,776	2,144,196	580	3.21
1	Citizens Electric	6280,734	255,511	25,223	1	80,603	6201,622	201,042	580	1.27
2	Fort Smith Traction	707,072	654,697	52,375	1	86,486	408,800	408,800	.....	1.60
3	Fort Smith and Van Buren	76,856	76,856	.....	.....	56,512	23,815	23,815	.....	3.23
4	Hot Springs Street Railroad	61252,354	1,195,000	.....	.....	128,772	6330,872	320,872	.....	3.72
5	Little Rock Traction and Electric	4,671,415	3,841,415	730,000	3	185,576	914,667	914,667	.....	4.20
6	Citizens Light and Transit	7837,638	747,500	90,138	1	96,452	7226,000	4226,000	.....	3.31
7	Texarkana Railway	109,500	109,500	.....	.....	41,165	49,000	49,000	.....	2.23
	CALIFORNIA.									
	Total for state.....	241,325,720	182,196,999	59,128,721	225	219,753	41,512,788	41,217,496	295,292	4.42
1	Bakersfield and Kern Electric	801,505	801,505	.....	.....	372,793	183,960	183,960	.....	4.36
2	Fresno, Belmont and Yosemite	109,500	109,500	.....	.....	43,800	40,880	40,880	.....	2.68
3	Fresno Railroad	80,000	80,000	.....	.....	27,586	30,000	30,000	.....	2.67
4	Nevada County Traction	354,114	354,114	.....	.....	69,434	70,130	70,130	.....	5.05
5	Los Angeles Electric Incline	300,000	300,000	.....	.....	2,142,857	9,678	9,678	.....	31.00
6	Los Angeles Railway	28,148,035	21,548,035	6,600,000	28	216,107	6,319,617	6,319,617	.....	3.41
7	Los Angeles and Pasadena	3,520,697	3,270,646	250,051	2	96,937	1,078,475	1,028,460	50,015	3.18
8	Los Angeles Pacific Railway	1,897,261	1,897,261	.....	.....	21,688	1,237,215	1,099,202	138,013	1.73
9	Pacific Electric Railway	884,763	644,251	240,512	5	55,158	237,764	237,764	.....	2.71
10	Los Angeles Traction	5,435,011	5,040,154	394,857	6	173,798	1,937,750	1,937,750	.....	2.60
11	Marysville and Yuba City	105,028	105,028	.....	.....	24,829	54,202	54,202	.....	1.94
12	Monrovia Street Railway	25,000	25,000	.....	.....	16,667	7,300	7,300	.....	3.42
13	Monterey and Pacific Grove	224,350	224,350	.....	.....	54,060	117,800	117,800	.....	1.90
14	Oakland Transit Consolidated	22,014,083	17,247,022	4,767,061	38	140,448	5,488,332	5,449,713	38,619	3.16
15	Ontario and San Antonio Heights	100,368	100,368	.....	.....	12,546	70,080	70,080	.....	1.43
16	Pasadena and Mt. Lowe	24,347	24,347	.....	.....	8,667	12,958	12,958	.....	1.88
17	Paso Robles Street Car	8,336	8,336	.....	.....	3,334	4,290	4,290	.....	1.94
18	Petaluma Street Railway	18,374	18,374	.....	.....	10,151	6,710	6,710	.....	2.74
19	Pomona Street Railway	102,945	102,945	.....	.....	40,213	451,000	51,000	.....	2.02
20	Redlands Street Railway	334,352	300,669	33,683	1	41,357	103,554	103,554	.....	2.90
21	Riverside and Arlington	547,051	547,051	.....	.....	57,463	184,204	182,888	1,316	2.99
22	Sacramento Electric, Gas and Railway	4,493,791	3,948,791	545,000	15	168,034	1,101,904	1,101,904	.....	3.58
23	San Bernardino Valley	299,854	289,058	10,796	2	37,934	83,673	83,673	.....	3.45
24	San Diego Electric Railway	2,220,000	2,220,000	.....	.....	133,735	542,808	542,808	.....	4.09
25	Geary Street, Park and Ocean	4,513,286	3,867,862	645,424	2	459,366	758,262	758,262	.....	5.10
26	California Street Cable	9,911,151	8,430,261	1,480,890	4	776,267	1,456,350	1,456,350	.....	5.79
27	Presidio and Ferries	4,558,543	3,264,229	1,294,314	2	382,290	641,670	641,670	.....	5.09
28	United Railroads of San Francisco	144,005,525	101,795,525	42,210,000	105	408,899	17,764,299	17,696,970	67,329	5.75
29	San Jose Railroad	1,688,078	1,479,309	208,769	6	97,680	564,530	564,530	.....	2.62
30	San Jose and Santa Clara	1,789,200	1,747,200	42,000	2	96,424	442,000	442,000	.....	3.95
31	Santa Barbara Consolidated	1,085,905	814,405	271,500	2	95,812	206,400	206,400	.....	3.95
32	Santa Cruz Electric	285,092	285,092	.....	.....	50,281	145,529	145,529	.....	1.96
33	East Santa Cruz	61,020	58,100	2,920	1	20,386	36,850	36,850	.....	1.58
34	Santa Rosa Street Railway	23,142	21,342	1,800	2	2,912	17,520	17,520	.....	1.22
35	Stockton Electric	1,356,013	1,226,869	129,144	2	102,410	505,094	505,094	.....	2.43
	COLORADO.									
	Total for state.....	1052,327,717	42,371,590	9,956,127	55	183,865	108,925,060	8,924,560	500	4.75
1	Boulder Railway and Utility	(12)	1,223,006	.....	.....	103,821	(12)	253,835	.....	4.82
2	Colorado Springs and Cripple Creek	5,802,639	5,802,639	.....	.....	200,022	1,326,527	1,326,527	.....	4.37
3	Colorado Springs Rapid Transit	175,233	175,233	.....	.....	29,206	65,153	65,153	.....	2.69
4	Denver, Lakewood and Golden	40,532,069	30,910,210	9,621,859	50	214,998	6,393,755	6,393,755	.....	4.83
5	Denver City Tramway	186,770	186,770	.....	.....	78,146	106,120	106,120	.....	1.76
6	Durango Railway and Realty	8,570	8,570	.....	.....	6,856	3,650	3,650	.....	2.35
7	Grand Junction (municipal)	4,399,430	4,065,162	334,268	5	112,142	776,020	775,520	500	5.24
8	Pueblo Traction and Lighting									
	CONNECTICUT.									
	Total for state.....	1398,358,167	77,447,101	15,911,066	96	134,194	1220,186,690	19,728,233	458,457	3.93
1	Branford Lighting and Water	662,765	662,765	.....	.....	101,807	178,553	178,553	.....	3.71
2	Connecticut Railway and Lighting	26,455,490	21,974,671	4,480,819	24	137,963	5,154,997	5,076,185	78,812	4.33
3	Bristol and Plainville Tramway	845,980	838,200	7,780	1	105,833	212,335	212,335	.....	3.95
4	Danbury and Bethel	1,895,155	1,431,576	463,579	2	122,044	347,880	347,780	100	4.12

¹ Fare passengers reported for 811 operating companies only, representing 22,496.85 miles of single track.

² Passenger car hours reported for 890 operating companies only, representing 2,176,886,559 fare passengers carried.

³ For 6 companies only.

⁴ Estimated.

⁵ Includes 3 companies operating part of year.

GENERAL TABLES.

353

MAXIMUM SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902.

CAR HOURS			Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.			In city limits.	Outside city limits.		Total.		Passengers.		Employees.		Others.		
								Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	
65,869,342	*65,403,287	466,055	33.28				352	1,218	47,429	265	26,690	122	3,699	831	17,040	
*761,719	729,335	32,384	29.49				8	15	335	1	198	1	111	13	26	
380,592	348,772	31,820	37.31	No.	6	15	1									1
20,440	20,440		9.52	Yes.	8	30	4	9	314	1	194		110	8	10	2
				No.	6											3
				Yes.	10	12			1		1					4
26,150	26,150		14.73	No.	12	15			12						12	5
211,329	210,765	564	26.91	Yes.	12	15	1	4	5		2		1	4	2	6
98,880	98,880		18.70	No.	10			2	1		1	1		1		7
24,328	24,328		16.15	No.	12	16	2		2						2	8
				No.	5	10										9
37,740	37,740		21.14				1									
27,520	27,520		27.25	No.	8	8	1									1
10,220	10,220		4.69	No.	7	7										2
							6	4	5	2	1			1	4	
				No.	8	8										1
				No.	20	20	2		1						1	2
				No.	12	12										3
				No.	8	8	1	1	3					1	3	4
				No.	10		2	2	1	2	1					5
				No.	12	12	1	1				1				6
				No.	4											7
*1,132,375	1,128,646	3,729	30.29				8	37	5,461	9	4,137		32	28	1,292	
20,835	20,835		38.47	No.	20			1	5	1	5					1
				No.	5			1						1		2
				No.	5	5										3
9,490	9,490		31.61	No.	8	16										4
				No.	3											5
				Yes.	8			7	333							6
				Yes.	8	20		1	17	1	17			*7	*333	7
				Yes.	8											8
				No.	8	20										9
				No.	8											10
				No.	5	6										11
				Yes.	4		1									12
656,763	653,034	3,729	26.41	No.	5											13
8,000	8,000		12.55	Yes.	8	35	2	3	452		362		8	3	82	14
				Yes.	12	12										15
				Yes.	5	5										16
				No.	5				1							17
1,493	1,493		12.31	No.	5										1	18
				No.	15											19
13,692	13,692		21.96	No.	10	20	1		1						1	20
				Yes.	8		1	1								21
103,433	103,433		38.18	No.	8	12	1		11		3		1	1	7	22
				No.	8			1	7							23
69,350	69,350		32.01	No.	8	8			3		3					24
				No.	9				17						5	25
218,294	218,294		38.62	No.	8				42		31		3		8	26
				No.	8		1	1	15	1	15					27
				Yes.	8	20		17	4,534	4	3,677		20	13	837	28
				No.	8				5		3				2	29
				No.	10	10		1	5					1	5	30
31,025	31,025		26.25	Yes.	8			1	6	1	6					31
				No.	8											32
				No.	5	5										33
				No.	6	6										34
				No.	8	12	1	1	7	1	3				4	35
*1910,004	910,004		40.54					10	880	2	77	1	15	7	788	
				No.	15											1
131,400	131,400		44.16	No.	6	25		1	11	1	6		3		2	2
7,665	7,665		22.86	No.	8	16		1	71	1	59		8		4	3
770,939	770,939		40.09	Yes.	12			6	781					*6	*781	4
				No.	15	20										5
				No.	8	10										6
				No.	4				1						1	7
				No.	10			2	16		12	1	4	1		8
*2,225,364	2,198,548	26,816	32.84				9	14	281	1	172	3	15	10	94	
590,664	590,664		37.20	No.	12	15										1
19,205	19,205		43.64	Yes.	8	15	3	2	87	1	57	1	3		27	2
				No.	10	15										3
				No.	7	10	1	1	18		18	1				4

* For 9 months only.

† For 9½ months only.

‡ For 10 companies only.

§ Includes passengers and employees.

|| For 7 companies only.

|| For 3 companies only.

|| Not reported.

|| Includes 2 companies operating part of year.

|| For 16 companies only, and includes 1 company operating part of year.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Trans-fer points.	Fare pas-sengers per mile of single track.	CAR MILEAGE.			Fare pas-sengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, ex-press, and other cars.	
CONNECTICUT—Continued.										
5	Greenwich Tramway	1 465,195	465,195	.....	.....	80,763	1 133,961	133,961	.....	3.47
6	Hartford and Springfield	883,722	841,829	41,893	1	62,497	290,966	290,777	189	2.90
7	Farmington Street Railway	294,649	294,649	.....	.....	20,181	208,832	197,777	11,055	1.49
8	Hartford Street Railway	19,160,216	15,777,106	3,383,110	22	167,985	4,291,176	4,132,328	158,848	3.82
9	Hartford, Manchester and Rockville	1,298,960	1,123,499	175,461	2	61,969	472,431	445,903	26,528	2.52
10	New York, New Haven and Hartford (Berlin sys.)	1,645,008	1,645,008	.....	.....	63,538	494,464	494,464	.....	3.33
11	Meriden, Southington and Compounce	961,820	961,820	.....	.....	66,839	323,654	323,206	448	2.98
12	Meriden Electric Railroad	3,266,383	2,589,737	676,646	6	132,807	689,012	689,012	.....	3.76
13	Middletown Street Railway	926,199	792,000	134,199	2	79,758	187,860	187,860	.....	4.22
14	Manufacturers Railroad	(2)	.....	.....	.....	.....	2,500	.....	2,500	.....
15	Fair Haven and Westville	25,016,259	19,275,153	5,741,106	21	201,475	5,137,357	4,958,804	178,553	3.89
16	New London Street Railway	1,452,870	1,320,791	132,079	1	155,205	243,209	243,209	.....	5.43
17	Montville Street Railway	1,521,901	1,505,837	16,064	2	111,461	228,760	227,682	1,078	6.61
18	Norwich Street Railway	2,528,200	2,186,835	341,365	5	123,900	401,323	401,323	.....	5.45
19	Peoples Tramway	1,180,918	1,179,019	1,899	1	71,716	379,460	379,114	346	3.11
20	Stamford Street Railroad	1,642,683	1,327,617	315,066	6	104,619	384,254	384,254	.....	3.46
21	New York, New Haven and Hartford (New Canaan branch)	204,900	204,900	.....	.....	23,743	139,602	139,602	.....	1.47
22	Suffield Street Railway	2 91,922	91,922	.....	.....	18,721	2 51,858	51,858	.....	1.77
23	Torrington and Winchester	956,972	956,972	.....	.....	73,444	232,246	232,246	.....	4.12
DELAWARE.										
Total for state		11,440,702	9,956,559	1,484,143	26	116,301	3,006,798	2,969,238	37,560	3.35
1	Wilmington and New Castle	584,000	584,000	.....	.....	33,371	338,840	301,280	37,560	1.94
2	Peoples Railway	1,634,102	1,467,473	166,629	7	46,765	746,758	746,758	.....	1.97
3	Wilmington City	9,222,600	7,905,086	1,317,514	19	193,847	1,921,200	1,921,200	.....	4.11
DISTRICT OF COLUMBIA.										
Total for district		90,203,941	66,162,321	24,041,620	69	408,485	16,139,141	16,082,204	56,937	4.11
1	Anacostia and Potomac River	8,435,988	6,072,874	2,363,114	12	265,191	1,165,799	1,163,887	1,912	5.22
2	Brightwood Railway	2,012,012	1,236,983	775,029	4	105,815	407,486	407,388	98	3.04
3	Capital Traction	36,871,334	28,362,565	8,508,769	15	685,749	8,787,603	8,781,343	6,260	3.23
4	City and Suburban of Washington	6,816,021	5,423,810	1,392,211	12	166,273	1,161,666	1,159,639	2,027	4.68
5	Columbia Railway	8,027,781	5,010,160	3,017,621	7	340,364	976,213	975,913	300	5.13
6	Georgetown and Tennallytown	1,037,338	768,617	268,721	2	92,382	209,766	208,814	952	3.68
7	Metropolitan Railroad	25,176,882	17,723,360	7,453,522	16	767,910	3,133,193	3,089,042	44,151	5.74
8	Washington and Great Falls	1,826,585	1,563,952	262,633	1	111,871	297,415	296,178	1,237	5.28
FLORIDA.										
Total for state		2 9,541,727	8,249,542	1,292,185	13	133,596	2 3,349,449	2,258,463	90,986	3.65
1	Fort Meade Street Railway	3,650	3,650	.....	.....	2,920	7 2,078	1,217	861	3.00
2	Jacksonville Electric	2 3,352,775	2,863,685	489,090	4	157,779	2 872,440	872,440	.....	3.28
3	Key West Electric	711,035	711,035	.....	.....	190,116	175,511	175,511	.....	4.05
4	Palatka and Heights Street Railway	10,880	10,880	.....	.....	3,109	7,300	7,300	.....	1.49
5	Pensacola Electric Terminal	1,215,121	998,290	216,831	4	110,921	385,988	385,988	.....	2.59
6	Tampa Electric	4,248,266	3,662,002	586,264	5	140,253	906,132	816,007	90,125	4.49
GEORGIA.										
Total for state		37,004,361	32,463,851	4,540,510	63	108,076	10,733,429	10,690,826	42,603	3.04
1	Athens Electric Railway	400,340	356,969	43,371	2	54,666	156,372	141,372	15,000	2.53
2	Georgia Railway and Electric	10 22,432,672	19,045,312	3,387,360	21	124,479	10 5,977,212	5,977,212	.....	3.19
3	Augusta Railway and Electric	2,518,586	2,360,674	157,912	6	76,102	932,381	932,381	.....	2.53
4	Columbus Railroad	1,386,373	1,217,479	168,894	2	71,616	474,216	474,216	.....	2.57
5	Covington and Oxford	41,000	41,000	.....	.....	18,222	6,205	6,205	.....	6.61
6	Macon Railway and Light	2,980,181	2,893,764	86,417	1	94,352	949,317	949,317	.....	3.05
7	City Electric Railway	451,449	385,749	65,700	1	61,425	219,000	219,000	.....	1.76
8	Savannah Electric	6,618,558	5,987,702	630,856	30	112,869	1,931,686	1,912,283	19,403	3.13
9	Valdosta Street Railway	158,802	158,802	.....	.....	76,347	65,700	65,700	.....	2.42
10	Washington Street Railway	16,400	16,400	.....	.....	10,933	21,340	13,140	8,200	1.25
IDAHO.										
Total for state		314,340	314,340	.....	.....	89,811	164,250	164,250	.....	1.91
1	Boise Rapid Transit	314,340	314,340	.....	.....	89,811	164,250	164,250	.....	1.91
ILLINOIS.										
Total for state		11 590,598,228	463,190,986	127,407,242	592	287,035	11 121,142,474	120,835,074	307,400	3.83
1	Alton Railway, Gas and Electric	1,665,130	1,497,130	168,000	3	122,215	401,500	401,500	.....	3.73
2	Elgin, Aurora and Southern	6,058,266	5,422,785	635,481	2	86,131	1,725,238	1,725,238	.....	3.14
3	Bloomington and Normal	13 1,869,349	1,309,781	559,568	4	62,371	13 1,396,490	1,396,490	.....	.94
4	Mechanicsburg and Buffalo	4,000	4,000	.....	.....	1,081	8,293	8,293	.....	.48
5	Cairo Electric Railway	805,447	684,319	121,128	1	120,691	261,000	261,000	.....	2.62
6	Egypt Electric	186,519	186,519	.....	.....	46,630	233,600	233,600	.....	.80
7	Centerville and Central City	80,956	80,956	.....	.....	23,671	38,325	38,325	.....	2.11
8	Urbana and Champaign	1,078,922	1,032,442	46,480	1	114,716	202,822	196,122	6,700	5.26
9	Chicago City Railway	167,279,723	117,863,990	49,415,733	75	529,726	30,842,510	30,643,250	199,260	3.85
10	Chicago Union Traction	220,452,619	156,136,898	64,315,721	300	511,388	30,732,051	30,732,051	.....	5.08
11	Chicago Consolidated Traction	24,172,655	20,808,682	3,363,973	130	100,764	8,016,591	8,016,591	.....	2.60
12	Calumet Electric Street Railway	8,480,219	6,549,719	1,930,500	20	80,921	2,393,978	2,393,978	.....	2.74
13	Chicago Electric Traction	2,066,402	1,898,647	167,755	5	70,634	954,000	954,000	.....	1.99

1 For 10½ months only.

2 Freight traffic only.

3 For 5 months only.

4 For 7 companies only.

5 Includes 1 company operating part of year.

6 For 2 companies only, and includes 1 company operating part of year.

7 Estimated.

GENERAL TABLES.

355

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.			In city limits.	Outside city limits.		Total.		Passengers.		Employees.		Others.		
								Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	
				No.	12											5
				No.	13	17		2	1					2	1	6
17,244	14,144	8,100	20.83	No.	10	20			6				6			7
510,230	492,074	18,156	32.06	Yes	10	15		3	62		27	1		2	35	8
41,219	38,099	3,120	29.49	Yes	8	16		1	9		4			1	5	9
				Yes												10
38,036	38,036		25.29	Yes	8	15			5		3				2	11
118,260	118,260		21.90	Yes	8		1		20		15		3		2	12
82,840	82,840		24.12	Yes	10	15	1									13
				No.	4											14
617,400	615,000	2,400	31.34	Yes	12	14	1	5	62		35		3	5	14	15
89,420	89,420		33.51	No.	7											16
18,036	18,036		83.49	Yes	7	18			4		3				1	17
60,768	60,768		35.99	Yes	7	11			4		2				2	18
31,632	31,692	40	37.32	No.	12	18	1		12		7				5	19
59,130	59,130		22.45	No.	12				1		1					20
				Yes												21
* 5,400	5,400		17.02	No.	12											22
25,880	25,880		36.98	No.	12	15	1									23
236,520	236,520		33.42				3	6	93	1	53		2	5	38	
				No.	6	20	1		6		3				3	1
236,520	236,520		33.42	No.	7	15	1	2	30	1	30			1		2
				No.	7	12	1	4	57		20		2	4	35	3
* 889,767	883,763	6,004	42.77				1	10	615	3	380	2	38	5	197	
159,050	158,798	252	38.24	Yes	12			1	70	1	43			6	21	1
45,806	45,791	15	27.01	Yes	12				37		22			3	12	2
				Yes	12	15	1		151		84			4		3
132,951	132,677	274	40.88	Yes	12	15			70		37			7	63	4
116,058	116,021	37	43.18	No.	12			3	58		37					5
23,736	23,802	134	82.57	No.		15		1	14	1	13			2	18	6
390,589	385,525	5,064	45.97	Yes	12			3	202		137	1	13	2	52	7
21,577	21,349	228	73.26	Yes		15		2	13		7	1	2	1	4	8
* 125,641	125,641		28.45				4	3	62	1	52			2	10	
* 100,568	100,568		28.48	Yes	5		1									1
25,073	25,073		28.36	Yes	12	9	1	2	48		40			2	8	2
				No.	12		1									3
				No.	10											4
				No.	10				4		3				1	5
				Yes	12	12	2	1	10	1	9				1	6
* 925,416	925,416		28.37				12	3	70		35	1	7	2	28	
* 625,868	625,868		30.43	No.	12	12			1		1					1
				No.	15	20	1									2
61,631	61,631		19.76	No.	12		2	1	15		15	1			7	3
				No.					12		4		1			4
				Yes	6	6										5
				No.	6	6	2		2						2	6
				No.	8	12	1									7
237,917	237,917		25.17	Yes	9	15	3	2	40		15		6	2	19	8
				No.	12	12	1									9
				No.	6											10
				No.	8	12		1						1		1
12,014,959	11,990,052	24,907	35.81				13	136	6,282	54	2,590	12	685	70	3,007	
				Yes	18		1		1						1	1
186,150	186,150		29.13	No.	10	30	1	3	60	1	32		8	2	20	2
				No.	15	20	1		4		4					3
				Yes	7	7										4
				No.	12											5
				No.	10				1						1	6
				No.	6	6										7
				Yes	15	20	1									8
3,888,751	3,863,844	24,907	30.50	Yes				40	2,236	5	67	1	415	34	1,754	9
3,941,638	3,941,638		89.61	Yes	12			37	2,815	35	1,737	2	125		953	10
770,958	770,958		26.99	Yes	12			3	478	3	331		67		80	11
220,896	220,896		29.65	No.	15	25		6	101		59		17	6	25	12
97,000	97,000		19.67	No.	12		1	1	7	1	7					13

* For 10 months only.

* For 3 companies only.

* Estimate based on report for 3 months.

* Includes 6 companies operating part of year.

* For 20 companies only, and includes 1 company operating part of year.

* For 6 months only.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
ILLINOIS—Continued.										
14	Chicago General Railway.....	2,164,877	1,805,665	359,212	2	70,150	501,385	501,385		3.60
15	Chicago General Electric Railway.....	72	72			48	5,475	5,475		.01
16	Suburban Railroad.....	803,694	803,694			18,438	490,100	490,100		1.64
17	Northwestern Elevated Railroad.....	21,769,081	21,769,081			716,796	5,365,474	5,365,474		4.06
18	South Side Elevated Railroad.....	27,188,965	27,188,965			1,179,063	7,774,749	7,774,749		3.56
19	Metropolitan West Side Elevated.....	35,372,909	35,372,909			855,658	9,823,704	9,823,704		3.60
20	South Chicago City Railway.....	5,157,258	4,532,047	625,211	7	117,961	1,399,985	1,399,985		3.20
21	Chicago and Milwaukee.....	1,861,156	1,861,156			41,824	1,136,966	1,136,966		1.64
22	Lake Street Elevated Railroad.....	15,515,475	15,515,475			585,711	4,190,645	4,190,645		3.70
23	Chicago and Joliet.....	5,014,912	4,439,692	575,220	1	70,595	1,346,654	1,346,654		3.30
24	Northern Electric Railway.....	38,250	38,250			9,562	75,000	75,000		.51
25	Danville Railway and Light.....	1,531,107	1,458,198	72,909	1	116,656	447,700	447,700		3.26
26	Danville, Paxton and Northern.....	428,167	428,167			30,583	92,150	92,150		4.65
27	Decatur Traction and Electric.....	2,010,676	1,596,305	414,371	1	118,245	653,080	653,080		2.44
28	East St. Louis Railway.....	6,010,499	4,794,036	1,216,463	3	240,303	1,295,632	1,295,632		3.70
29	St. Louis and Belleville.....	(5)					35,040		35,040	
30	East St. Louis and Suburban.....	5,636,101	5,386,653	249,448	1	92,522	1,177,566	1,136,166	41,400	4.74
31	St. Louis and East St. Louis.....	2,000,000	2,000,000			943,396	175,000	175,000		11.43
32	Granite City and St. Louis.....	1,882,465	738,114	144,351	1	55,707	164,977	164,977		4.47
33	Freeport Electric.....	495,000	420,000	75,000	2	56,000	164,250	164,250		2.56
34	Galesburg Electric Motor.....	1,810,000	1,750,000	60,000	2	102,941	565,750	565,750		8.09
35	Chicago, Harvard and Geneva Lake.....	73,000	73,000			6,565	85,000	60,000	25,000	1.22
36	Jacksonville Railway.....	636,149	606,149	30,000	1	116,792	225,000	225,000		2.69
37	Kankakee Electric Railway.....	657,741	375,852	281,889	1	44,480	94,476	94,476		3.98
38	North Kankakee Light and Railway.....	338,917	338,917			78,272	94,900	94,900		3.57
39	Lincoln Street Car.....	63,120	58,440	4,680	1	8,289	25,200	25,200		2.32
40	Coal Belt Electric Railway.....	282,085	282,085			16,305	290,000	290,000		.97
41	Murphysboro Street Railway.....	22,256	22,256			14,359	6,528	6,528		3.41
42	Ottawa Railway, Light and Power.....	448,056	408,056	40,000	1	48,007	181,008	181,008		2.25
43	Peoria and Prospect Heights.....	750,000	750,000			115,385	328,500	328,500		2.28
44	Central Railway.....	6,000,000	6,000,000		16	171,429	2,543,941	2,543,941		2.36
45	Peoria and Pekin Terminal.....	704,905	704,905			49,711	263,792	263,792		2.67
46	Quincy Horse Railway.....	2,802,237	2,127,623	674,614	4	122,418	744,965	744,965		2.86
47	Rockford Railway, Light and Power.....	2,446,060	1,989,080	456,980	1	86,482	694,362	694,362		2.86
48	Rockford and Belvidere.....	163,823	163,673	150	1	11,074	34,160	34,160		4.79
49	Springfield Consolidated.....	4,917,918	3,532,013	1,385,905	3	148,217	1,260,000	1,260,000		2.80
50	Peoples Light and Railway.....	401,090	384,590	16,500	1	69,925	182,962	182,962		2.10
INDIANA.										
Total for state.....		80,974,221	66,255,767	14,718,454	62	102,458	21,095,357	20,931,788	163,569	3.17
1	Brownstown and Ewing.....	20,000	20,000			20,000	7,094	7,094		2.82
2	John S. Crump.....	133,466	133,466			30,333	132,860	132,860		1.00
3	Evansville Electric Railway.....	4,642,836	3,629,534	1,013,302	4	119,001	1,309,838	1,309,838		2.77
4	Fort Wayne Traction.....	5,663,409	4,231,766	1,431,643	4	132,243	1,505,774	1,505,774		2.81
5	Fort Wayne and Southwestern.....	113,723	113,723			4,272	140,048	140,048		.81
6	Hammond, Whiting and East Chicago.....	2,337,255	1,956,616	380,639	4	78,579	590,234	590,234		3.31
7	Indianapolis Street Railway.....	38,925,929	30,005,026	8,920,903	27	273,121	6,921,490	6,921,490		4.34
8	Broad Ripple Traction.....	417,881	417,881			58,039	119,710	119,710		3.49
9	Indianapolis, Shelbyville and Southeastern.....	111,814	111,814			8,721	93,985	93,985		1.19
10	Indianapolis and Eastern.....	570,183	570,183			20,191	368,661	342,831	25,830	1.66
11	Union Traction.....	11,195,770	9,720,454	1,475,316	8	64,777	3,876,166	3,800,342	75,824	2.56
12	Indianapolis, Greenwood and Franklin.....	559,639	559,639			25,438	457,710	457,710		1.22
13	Jeffersonville City Railway.....	91,000	91,000			50,838	25,550	25,550		3.56
14	Kokomo Railway and Light.....	631,877	576,877	55,000	2	53,663	219,000	219,000		2.63
15	Lafayette Street Railway.....	1,834,955	1,475,135	359,820	2	100,623	611,000	611,000		2.41
16	Logansport Railway.....	269,441	261,441	8,000	1	42,442	102,000	102,000		2.56
17	Logansport, Rochester and Northern.....	162,733	153,641	9,092	1	25,607	120,772	120,772		1.27
18	Madison Light and Railway.....	165,000	165,000			41,250	176,996	176,996		.93
19	Lake Cities.....	198,000	198,000			96,117	84,720	84,720		2.33
20	Highland Railroad.....	56,118	56,118			28,059	25,806	25,806		2.17
21	New Albany Street Railroad.....	913,453	913,453			149,501	210,240	210,240		4.34
22	Richmond Street and Interurban.....	1,380,500	1,200,300	180,200	2	39,354	540,200	540,200		2.22
23	Indiana Railway.....	4,278,157	3,946,728	331,429	2	80,959	1,333,707	1,301,311	32,396	3.03
24	Terre Haute Electric.....	4,262,493	3,709,383	553,110	5	97,385	1,330,522	1,306,453	24,069	2.84
25	Vincennes Citizens.....	450,000	450,000			56,250	388,725	388,725		1.16
26	Wabash River Traction.....	1,391,409	1,391,409			70,096	315,303	309,853	5,450	4.49
27	Washington Street Railway.....	197,180	197,180			49,919	87,246	87,246		2.26
IOWA.										
Total for state.....		44,076,534	38,559,589	5,516,945	61	101,942	11,809,254	11,688,888	120,366	3.30
1	Boone Electric.....	480,000	480,000			73,846	128,200	128,200		3.74
2	Burlington Railway and Light.....	2,000,000	1,600,000	400,000	2	110,345	548,240	548,240		2.92
3	Cedar Rapids and Marion City.....	1,545,088	1,403,064	142,024	4	101,745	498,185	486,418	11,767	2.88
4	Peoples Street Railway.....	145,000	145,000			89,506	45,072	45,072		3.22
5	State Electric.....	1,152,835	1,109,835	43,000	2	130,262	327,257	327,257		3.39
6	Omaha and Council Bluffs.....	3,146,916	2,792,659	354,257	2	83,613	1,320,111	1,320,111		2.12
7	Tri-City Railway.....	10,084,812	9,042,176	1,042,636	12	179,408	2,473,016	2,473,016		3.66
8	Des Moines City Railway.....	12,457,283	10,515,912	1,941,371	11	110,484	2,234,122	2,234,122		4.71
9	Interurban Railway.....	2,718,228	2,391,355	326,873	10	114,693	803,320	803,320		2.98
10	Union Electric.....	56,000	56,000			37,333	6,900	6,900		8.12
11	Fort Dodge Light and Power.....	292,423	292,423			73,106	109,500	109,500		2.67
12	Fort Madison Street Railway.....	94,288	94,288			27,732	51,000	51,000		1.85
13	Keokuk Railway and Power.....	350,000	300,000	50,000	2	46,154	250,000	250,000		1.20
14	Marshalltown Light, Power and Railway.....	398,015	395,080	2,935	1	109,744	132,495	132,495		2.98
15	Mason City and Clear Lake.....	293,320	287,845	5,475	3	16,600	158,633	146,466	12,167	1.97
16	Citizens Railway and Light.....	1,153,494	865,120	288,374	1	100,595	255,500	255,500		3.39
17	Ottumwa Traction and Light.....	1,481,028	1,211,028	270,000	2	121,103	396,288	396,288		3.06
18	Red Oak Street Railway.....	25,820	25,820			21,517	15,768	15,768		1.64
19	Sioux City Traction.....	4,738,944	4,138,944	600,000	3	96,255	1,475,695	1,475,695		2.80
20	Tama and Toledo.....	144,000	144,000			48,000	43,800	43,800		3.29
21	Waterloo and Cedar Falls.....	1,319,040	1,269,040	50,000	6	31,726	536,152	439,720	96,432	2.89

1 For 6 months only.

2 Freight traffic only.

3 For 4 months only.

4 For 10 months only.

5 Estimated.

6 Includes 4 companies operating part of year.

GENERAL TABLES.

357

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passengers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, express, and other cars.			In city limits.	Outside city limits.		Total.	Passengers.	Employees.	Others.	Killed.	Injured.	Killed.	Injured.	
56,000	56,000		32.24	No.	9			2	13		4		2	2	7	14
3,650	3,650		02	No.	10											15
60,862	60,862		13.21	No.	15			1	4		1				1	16
382,378	382,378		56.93	No.	30			3	34	2	31	1				17
554,400	554,400		49.04	No.	25			3	7	2	1	1			5	18
818,642	818,642		43.21	No.	16			2	22	1	22	1				19
134,929	134,929		33.59	No.	12				135		68				4	20
76,668	76,668		24.28	No.	20	40		3	41		25				6	21
279,376	279,376		55.54	No.	40			3	79	1	65	1			8	22
140,156	140,156		31.68	No.	10	25		6	99	1	71	3			13	23
				No.	10											24
				No.	12	15		6	11		11	1			5	25
				No.	15	16		1	3		1					26
				No.	10	10		1	3						1	27
				No.	10			1	22	1	7				3	28
				No.	10											29
				Yes	10	40		4	12		6				4	30
				No.	10											31
				No.	18	30		1	2		2				1	32
				No.	8	12		1	1			1				33
				No.	10	20		2	6	1					1	34
				Yes	10	12										35
				No.	8	9										36
				Yes	8		1									37
				Yes	8	9										38
				No.	12				1							39
*24,000	24,000		11.75	Yes	8	25	1	2	2						2	40
				No.	4		1									41
43,435	43,435		9.39	No.	8	15	1	1	2		1				1	42
39,420	39,420		19.03	Yes			1		16		6				1	43
296,650	296,650		20.29	Yes	12		2	2	32		10				2	44
				Yes	7	12	1		5						2	45
				Yes	12				12		5				1	46
				No.	8		2									47
				No.	12	30	1	1	15		15				1	48
				No.	8		1									49
				No.	9											50
*1,535,344	1,522,321	13,023	23.46				11	20	2,636	2	1,900	3	84	15	652	
3,650	3,650		5.48	No.	4											1
15,230	15,230		8.76	No.	12											2
165,114	165,114		21.98	No.	15	15		2	23						2	3
178,054	178,054		23.77	No.	15	15	1		10							4
				No.	8	14										5
55,938	55,938		34.98	Yes	8	15			33		23				1	6
				Yes	9	12	1	5	2,124		1,569				56	7
				No.	8	12	1	1	7		5				1	8
*7,000	7,000		15.97	No.	8	55			1		1					9
32,200	29,200	3,000	19.53	No.	8	40	1									10
334,910	331,310	3,600	29.34	Yes	20	65	1	4	308		241	2	5	2	62	11
24,090	24,090		23.32	No.	6	30	1		1						1	12
16,425	16,425		5.54	No.	4											13
29,200	29,200		19.76	No.	8	15	1		6		4				1	14
61,890	61,890		23.83	Yes	10		1		7		3				2	15
*12,000	12,000		21.79	No.	7	12			2		2					16
*13,596	13,596		11.30	No.	15	25			1							17
23,360	23,360		7.06	No.	15		1									18
8,470	8,470		23.38	Yes	12											19
5,917	5,917		9.48	No.		4										20
52,560	52,560		17.38	No.	10			1							1	21
62,780	62,780		19.12	No.	10	15		1	8		1	5				22
132,278	130,400	1,878	30.27	Yes	8	40	1	1	1						1	23
226,831	222,831	4,000	16.65	Yes	8	15		5	100		46	1			18	24
29,200	29,200		15.41	No.	8				1		1					25
30,110	29,565	545	47.06	No.	15	30	1		3							26
14,541	14,541		13.56	No.	10	12										27
*1,121,902	1,118,252	3,650	26.76				12	19	238	5	152	3	36	11	50	
79,280	79,280		20.18	No.	10	10										1
				Yes	8			1	4		3				1	2
10,016	10,016		14.48	No.	8	12		2	29		16	1		1		3
				No.	12											4
				No.	15	15	1		11		11					5
				Yes	12	12		2	38		20	1				6
321,774	321,774		28.10	Yes	12	15	2	1	46		28				5	7
*307,059	307,059		34.25	Yes	12		1	2	71	1	50				6	8
				No.		50			2						2	9
98,216	98,216		24.35	No.	8	20	1	1	23	1	15				8	10
				No.	8			1								11
14,600	14,600		20.03	No.	6			2								12
				No.	12		1								2	13
35,000	35,000		8.57	No.	12		1	2	3			1				14
				No.	10											15
27,075	23,425	3,650	12.29	Yes	12	15										16
				No.	12			1	7	1	7					17
42,732	42,732		28.34	Yes	8	11		1	3		2					18
				No.	8				1							19
186,150	186,150		22.23	Yes	8	12	1	1								20
				No.	12		1									21
				No.	12	25	1	2							2	22

* For 24 companies only, and includes 3 companies operating part of year.

* For 3 months only.

* For 11 companies only.

* Includes figures for Interurban Railway Company.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
KANSAS.										
	Total for state.....	7,970,581	6,832,064	1,138,517	18	61,406	2,417,364	2,417,364		2.83
1	Arkansas City Street Railway.....	25,240	25,240			4,589	12,100	12,100		2.09
2	Atchison Railway, Light and Power.....	651,947	533,867	118,080	1	59,319	146,000	146,000		3.66
3	Fort Scott Consolidated Supply.....	220,000	205,000	15,000	1	22,778	167,200	167,200		1.23
4	Hutchinson Street Railway.....	189,905	189,905			24,264	*70,000	70,000		2.71
5	Iola Electric Railroad.....	566,800	566,800			68,703	108,700	108,700		5.21
6	Electric Railway and Ice.....	300,103	299,743	360	1	66,610	75,920	75,920		3.96
7	Kansas City-Leavenworth *.....									
8	Pittsburg Railroad.....	686,200	660,000	25,200	1	56,170	177,025	177,025		8.73
9	Consolidated Street Railway.....	76,222	76,222			37,181	36,557	36,557		2.09
10	Topeka Railway.....	3,350,164	2,730,287	619,877	10	95,365	864,487	864,487		3.16
11	Wichita Railroad and Light.....	1,810,000	1,460,000	350,000	3	78,919	732,000	732,000		1.99
12	Union Street Railway.....	95,000	85,000	10,000	1	13,600	27,375	27,375		3.11
KENTUCKY.										
	Total for state.....	*61,683,130	56,293,852	5,389,278	21	198,253	*15,477,507	15,451,572	25,935	3.64
1	Bowling Green Railway.....	150,000	150,000			37,500	90,000	90,000		1.67
2	Cincinnati, Newport and Covington.....	18,621,952	16,264,745	2,357,207	10	290,442	3,310,345	3,310,300	45	4.91
3	Frankfort and Suburban.....	173,725	173,725			23,929	155,490	153,300	2,190	1.13
4	Henderson Street Railway.....	448,000	280,000	168,000	1	50,909	182,500	182,500		1.53
5	Lexington Railway.....	2,380,682	2,350,682	30,000	1	155,366	732,108	732,108		3.21
6	Georgetown and Lexington.....	*25,000	25,000			1,911	*6,000	6,000		4.17
7	Louisville Railway.....	35,659,000	33,158,500	2,500,500	5	233,511	9,137,604	9,137,604		3.63
8	Louisville, Anchorage and Pewee.....	541,700	541,700			29,124	428,700	405,000	23,700	1.34
9	Kentucky and Indiana.....	1,344,888	1,344,888			222,664	429,240	429,240		3.13
10	Maysville Street Railroad.....	309,621	309,621			72,852	175,200	175,200		1.77
11	Owensboro City Railroad.....	*290,956	257,385	33,571	3	30,281	*130,320	130,320		1.98
12	Paducah City Railway.....	1,737,606	1,437,606	300,000	1	89,850	700,000	700,000		2.05
LOUISIANA.										
	Total for state.....	60,285,120	55,343,843	4,941,277	15	278,782	18,594,869	18,594,869		2.98
1	Baton Rouge Electric and Gas.....	359,770	359,770			95,939	*198,400	198,400		1.81
2	Lake Charles Street Railway.....	128,160	128,160			60,739	61,320	61,320		2.09
3	St. Charles Street Railroad.....	5,911,900	5,767,900	144,000	2	310,603	2,196,588	2,196,588		2.63
4	Orleans Railroad.....	2,518,633	2,505,700	12,933	2	217,320	785,210	785,210		3.19
5	New Orleans Railway.....	33,089,252	29,465,376	3,623,876	8	256,221	10,355,381	10,355,381		2.65
6	New Orleans and Carrollton.....	16,606,765	15,445,297	1,160,468	3	434,711	4,472,990	4,472,990		3.45
7	Algiers, McDonoghville and Gretna.....	221,640	221,640			62,434	91,980	91,980		2.41
8	Shreveport Belt Railway.....	1,450,000	1,450,000			164,773	433,000	433,000		3.35
MAINE.										
	Total for state.....	*27,506,582	25,495,164	2,011,418	14	76,897	*6,815,671	6,389,750	425,921	3.99
1	Augusta, Winthrop and Gardiner.....	1,192,748	1,192,748			90,980	329,588	329,588		3.62
2	Public Works.....	1,453,143	1,208,216	244,927	1	111,872	346,574	346,574		3.49
3	Penobscot Central Railway.....	296,548	295,548			10,712	58,971	44,228	14,743	6.68
4	Bangor, Orono and Old Town.....	1,152,848	1,152,848			69,033	314,376	308,839	5,537	3.73
5	Bangor, Hampden and Winterport.....	435,721	435,721			62,069	96,552	96,052	500	4.54
6	Biddeford and Saco.....	728,909	728,909			89,437	309,106	309,106		2.36
7	Calais Street Railway.....	566,514	546,760	19,754	2	77,008	183,960	182,960	1,000	2.99
8	Benton and Fairfield.....	52,282	52,282			11,964	204,988	25,564	179,424	2.05
9	Fryeburg Horse Railway.....	14,600	14,600			4,867	6,500	6,500		2.25
10	Atlantic Shore Line.....	92,758	92,758			58,708	26,064	26,064		3.56
11	Lewiston, Brunswick and Bath.....	4,436,152	4,237,065	199,087	2	75,419	1,083,822	1,049,697	34,125	4.04
12	Norway and Paris.....	139,909	139,909			65,378	44,730	44,730		3.13
13	Portland Railroad.....	12,386,706	10,839,056	1,547,650	9	120,931	2,551,203	2,551,203		4.25
14	Portsmouth, Kittery and York.....	1,506,611	1,506,611			95,962	345,415	316,195	29,220	4.76
15	Rockland, Thomaston and Camden.....	1,370,129	1,370,129			63,315	369,742	218,242	151,500	6.28
16	Sanford and Cape Porpoise.....	845,157	845,157			33,287	305,169	305,169		2.77
17	Skowhegan and Norridgewock Railway and Power.....	*162,296	62,296			10,649	*23,344	22,746	598	2.74
18	Somerset Traction.....	164,647	164,647			12,985	100,949	91,675	9,274	1.80
19	Waterville and Fairfield Railway and Light.....	609,904	609,904			126,536	114,618	114,618		5.32
MARYLAND.										
	Total for state.....	*135,625,650	99,989,552	35,636,098	144	228,370	*24,832,662	24,238,490	594,172	4.13
1	United Railways.....	132,106,412	96,763,878	35,342,534	142	265,019	23,876,837	23,330,292	546,545	4.15
2	Cumberland Electric Railway.....	1,266,883	1,066,883	200,000	1	150,903	219,000	219,000		4.87
3	Frederick and Middletown.....	280,933	280,933			19,137	85,908	40,000	45,908	7.02
4	Kensington Railway.....	1438,966	38,966			15,402	149,887	9,887		8.94
5	Cumberland and Westernport.....	*1206,823	206,823			23,719	14,26,740	*26,740		7.73
6	Hagerstown Railway.....	736,311	642,747	93,564	1	46,916	310,688	310,688		2.07
7	Baltimore and Washington.....	45,600	45,600			22,800	15,000	15,000		3.04
8	Washington and Glen Echo.....	117,457	117,457			10,134	63,771	63,689	82	1.84
9	Washington and Rockville.....	621,803	621,803			57,046	151,291	149,716	1,575	4.15
10	Washington, Woodside and Forest Glen.....	204,462	204,462			75,170	73,478	73,478	62	2.78
MASSACHUSETTS.										
	Total for state.....	15 605,258,939	461,745,615	143,513,324	250	182,822	15 101,373,975	100,115,307	1,258,668	4.61
1	Amherst and Sunderland.....	438,958	431,435	7,523	1	29,014	175,658	175,658		2.46
2	Interstate Consolidated.....	3,504,931	3,504,931			126,806	744,982	744,982		4.70
3	Lexington and Boston.....	2,908,985	2,691,301	217,684	10	72,659	911,692	911,692		2.95
4	Old Colony Street Railway.....	53,653,181	46,321,681	7,331,500	36	122,137	9,997,394	9,296,467	700,927	4.98

* For 8 companies only.

* Estimated.

* This company failed to make a report.

* Includes 2 companies operating part of year.

* For 9 companies only, and includes 1 company operating part of year

* For 14 months only.

* Not reported.

* For 6 months only.

GENERAL TABLES.

359

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passengers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, express, and other cars.			In city limits.	Outside city limits.		Total.		Passengers.		Employees.		Others.		
			Killed.	Injured.			Killed.	Injured.	Killed.	Injured.	Killed.	Injured.				
1203,390	203,390		18.82				3	1	33		8	1	11		14	1
2,920	2,920		8.64	No.	6	6										2
34,675	34,675		15.40	No.	8	8	1									3
18,500	18,500		11.08	No.	12	12	1		2							4
13,423	13,423		42.23	No.	5											5
8,760	8,760		34.22	No.	10	25	1	1	2			1	1		1	6
27,010	27,010		24.44	No.	10	25										7
9,855	9,855		7.73	No.	15	15										8
88,247	88,247		16.54	No.	6	6										9
				Yes	8	25			29		8		10		11	10
				No.	12	12										11
				No.	5											12
3,006,531	3,003,976	2,555	13.21				2	9	51	1	38	1	1	7	12	1
6,570	6,570		22.83	No.	8	15										2
5,840	5,110	730	34.00	Yes	10	10		2	20		20			2		3
29,200	29,200		9.59	No.	6	8	1									4
101,088	101,088		23.25	No.	12	15		1	5				1	1	4	5
2,628,000	2,628,000	1,825	12.62	No.	6	6			15		14				1	6
36,825	35,000		15.48	Yes	8	20		(1)	(1)							7
94,528	94,528		14.23	No.	12	20		2	1			1		1	1	8
14,480	14,480		17.78	No.	10	45										9
90,000	90,000		15.97	No.	12	12		4		1				3	2	10
				No.	8	15	1		6		4				4	11
				No.	10	10										12
2,025,648	2,025,648		27.32				4	27	1,230	1	865		64	26	301	
22,889	22,889		15.72	No.	12		2									1
10,220	10,220		12.54	No.	6											2
235,872	235,872		24.45	No.	10			1	24		14		3	1	7	3
93,072	93,072		26.92	No.	15			1	8		5		1	1	2	4
1,119,396	1,119,396		26.32	Yes	15		1	16	1,151		830		59	16	262	5
467,784	467,784		33.02	No.	15		1	6	42	1	16			5	26	6
18,615	18,615		11.91	No.	6	6		3	5				1	3	4	7
57,800	57,800		25.09	No.	12											8
10,456,023	379,444	76,579	32.97				11	4	26	1	26			3		
55,440	55,440		21.79	Yes	6	9										1
13,140	8,760	4,380	33.74	No.	8				3		3					2
31,095	29,988	1,107	38.44	Yes	6	20										3
12,522	10,962	1,560	39.75	No.	8				6		6					4
48,545	48,545		15.02	Yes	8	12	1									5
19,876	19,710	166	27.74	No.	6											6
41,245	6,205	35,040	8.43	No.	8											7
				Yes	12	20										8
				No.	6											9
96,730	91,980	3,750	46.07	No.	6											10
6,205	6,205		22.55	No.	7	15	2	1	1		1			1		11
34,367	29,445	4,922	51.17	Yes	4											12
70,115	46,355	23,760	29.56	Yes	10	15	3	1	16	1	16					13
				Yes	6	13		2						2		14
				Yes	6		1									15
				Yes	6		1									16
				Yes	7	12	1									17
				Yes	8	20	1									18
				No.	9		1									19
107,517	67,283	234	26.65				6		1,335		700				635	
				Yes	12	14	3		1,323		1,688				1,635	1
				Yes	6	8	1		2		2					2
				Yes	6	12	1									3
				No.	8											4
				No.	5	12										5
				No.	12	14										6
				No.	8	15	1									7
				No.	12	15			1		1					8
				No.	12	15			6		6					9
				No.	15	15			3		3					10
11,287,251	11,244,744	42,507	38.11				31	82	4,142	18	2,854	9	238	55	1,050	
21,900	21,900		19.70	Yes	10	15		1	2		1			1	1	1
				Yes	8				1							2
				No.	10			2	8	1	5			1	3	3
1,013,309	1,013,309		45.71	Yes	8	28	5	13	445	4	281	1	69	8	95	4

* Includes 1 company operating part of year.

10 For 14 companies only, and includes 1 company operating part of year.

11 For 10 months only.

12 For 5 companies only, and includes 1 company operating part of year.

13 Persons killed not reported separately.

14 For 24 months only.

15 Includes 11 companies operating part of year.

16 For 46 companies only, and includes 7 companies operating part of year.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
KANSAS.										
	Total for state.....	7,970,581	6,832,064	1,138,517	18	61,406	2,417,364	2,417,364		2.83
1	Arkansas City Street Railway.....	25,240	25,240			4,589	12,100	12,100		2.09
2	Atchison Railway, Light and Power.....	651,947	533,867	118,080	1	59,319	146,000	146,000		3.66
3	Fort Scott Consolidated Supply.....	220,000	205,000	15,000	1	22,778	167,200	167,200		1.22
4	Hutchinson Street Railway.....	189,905	189,905			24,254	70,000	70,000		2.71
5	Iola Electric Railroad.....	566,800	566,800			68,703	108,700	108,700		5.21
6	Electric Railway and Ice.....	300,103	299,743	360	1	66,610	75,920	75,920		3.95
7	Kansas City-Leavenworth ¹									
8	Pittsburg Railroad.....	685,200	660,000	25,200	1	56,170	177,025	177,025		3.73
9	Consolidated Street Railway.....	76,222	76,222			37,181	36,557	36,557		2.09
10	Topeka Railway.....	3,350,164	2,730,287	619,877	10	95,365	864,487	864,487		3.16
11	Wichita Railroad and Light.....	1,810,000	1,460,000	350,000	3	78,919	732,000	732,000		1.99
12	Union Street Railway.....	95,000	85,000	10,000	1	13,600	27,375	27,375		3.11
KENTUCKY.										
	Total for state.....	*61,683,130	56,293,852	5,389,278	21	198,258	*15,477,507	15,451,572	25,935	3.64
1	Bowling Green Railway.....	150,000	150,000			37,500	90,000	90,000		1.67
2	Cincinnati, Newport and Covington.....	18,621,952	16,264,745	2,357,207	10	290,442	3,310,345	3,310,300	45	4.91
3	Frankfort and Suburban.....	173,725	173,725			23,929	155,490	153,300	2,190	1.13
4	Henderson Street Railway.....	448,000	280,000	168,000	1	50,909	182,500	182,500		1.53
5	Lexington Railway.....	2,380,682	2,350,682	30,000	1	155,366	732,108	732,108		3.21
6	Georgetown and Lexington.....	*25,000	25,000			1,911	*6,000	6,000		4.17
7	Louisville Railway.....	35,659,000	33,158,500	2,500,500	5	233,511	9,137,604	9,137,604		3.63
8	Louisville, Anchorage and Pewee.....	541,700	541,700			29,124	428,700	405,000	23,700	1.34
9	Kentucky and Indiana.....	1,344,888	1,344,888			222,664	429,240	429,240		3.13
10	Maysville Street Railroad.....	309,621	309,621			72,852	175,200	175,200		1.77
11	Owensboro City Railroad.....	*290,956	257,385	33,571	3	30,281	*130,320	130,320		1.98
12	Paducah City Railway.....	1,737,606	1,437,606	300,000	1	89,850	700,000	700,000		2.05
LOUISIANA.										
	Total for state.....	60,285,120	55,843,843	4,441,277	15	278,782	18,594,869	18,594,869		2.98
1	Baton Rouge Electric and Gas.....	359,770	359,770			95,939	*198,400	198,400		1.81
2	Lake Charles Street Railway.....	128,160	128,160			60,739	61,320	61,320		2.09
3	St. Charles Street Railroad.....	5,911,900	5,767,900	144,000	2	310,603	2,196,588	2,196,588		2.63
4	Orleans Railroad.....	2,518,633	2,505,700	12,933	2	217,320	785,210	785,210		3.19
5	New Orleans Railways.....	33,089,252	29,465,376	3,623,876	8	256,221	10,355,381	10,355,381		2.85
6	New Orleans and Carrollton.....	16,605,765	15,445,297	1,160,468	3	434,711	4,472,990	4,472,990		3.45
7	Algiers, McDonoghville and Gretna.....	221,640	221,640			62,434	91,980	91,980		2.41
8	Shreveport Belt Railway.....	1,450,000	1,450,000			164,773	433,000	433,000		3.35
MAINE.										
	Total for state.....	*27,506,582	25,495,164	2,011,418	14	76,897	*6,815,671	6,389,750	425,921	3.99
1	Augusta, Winthrop and Gardiner.....	1,192,748	1,192,748			90,980	329,588	329,588		3.62
2	Public Works.....	1,453,143	1,208,216	244,927	1	111,872	346,574	346,574		3.49
3	Penobscot Central Railway.....	295,548	295,548			10,712	58,971	44,228	14,743	6.68
4	Bangor, Orono and Old Town.....	1,152,848	1,152,848			69,033	314,376	308,839	5,537	3.73
5	Bangor, Hampden and Winterport.....	435,721	435,721			62,069	96,552	96,052	500	4.54
6	Biddeford and Saco.....	728,909	728,909			89,437	309,106	309,106		2.36
7	Calais Street Railway.....	566,514	546,760	19,754	2	77,008	183,960	182,960	1,000	2.99
8	Benton and Fairfield.....	52,282	52,282			11,964	204,988	25,564	179,424	2.05
9	Fryeburg Horse Railway.....	14,600	14,600			4,867	6,500	6,500		2.25
10	Atlantic Shore Line.....	92,758	92,758			58,708	26,064	26,064		3.56
11	Lewiston, Brunswick and Bath.....	4,436,152	4,237,065	199,087	2	75,419	1,083,822	1,049,697	34,125	4.04
12	Norway and Paris.....	139,909	139,909			65,378	44,730	44,730		3.13
13	Portland Railroad.....	12,386,706	10,839,056	1,547,650	9	120,931	2,551,203	2,551,203		4.25
14	Portsmouth, Kittery and York.....	1,506,611	1,506,611			95,962	345,415	316,195	29,220	4.76
15	Rockland, Thomaston and Camden.....	1,370,129	1,370,129			63,315	369,742	218,242	151,500	6.28
16	Sanford and Cape Porpoise.....	845,157	845,157			33,287	305,169	305,169		2.77
17	Skowhegan and Norridgewock Railway and Power.....	1162,296	62,296			10,649	22,746		598	2.74
18	Somerset Traction.....	164,647	164,647			12,985	100,949	91,675	9,274	1.80
19	Waterville and Fairfield Railway and Light.....	609,904	609,904			126,536	114,618	114,618		5.32
MARYLAND.										
	Total for state.....	*135,625,650	99,989,552	35,636,098	144	228,370	*24,832,662	24,238,490	594,172	4.13
1	United Railways.....	132,106,412	96,763,878	35,342,534	142	265,019	23,876,837	23,330,292	546,545	4.15
2	Cumberland Electric Railway.....	1,266,883	1,066,883	200,000	1	150,903	219,000	219,000		4.87
3	Frederick and Middletown.....	280,933	280,933			19,137	85,908	40,000	45,908	7.02
4	Kensington Railway.....	1438,966	38,966			15,402	119,887	9,887		3.94
5	Cumberland and Westernport.....	*1206,823	206,823			23,719	*126,740	*26,740		7.73
6	Hagerstown Railway.....	736,311	642,747	93,564	1	46,916	310,688	310,688		2.07
7	Baltimore and Washington.....	45,600	45,600			22,800	15,000	15,000		3.04
8	Washington and Glen Echo.....	117,457	117,457			10,134	63,771	63,689	82	1.84
9	Washington and Rockville.....	621,803	621,803			57,046	151,291	149,716	1,575	4.15
10	Washington, Woodside and Forest Glen.....	204,462	204,462			75,170	73,540	73,478	62	2.78
MASSACHUSETTS.										
	Total for state.....	15,605,258,939	461,745,615	143,513,324	250	182,822	15,101,373,975	100,115,307	1,258,668	4.61
1	Amherst and Sunderland.....	438,958	431,435	7,523	1	29,014	175,658	175,658		2.46
2	Interstate Consolidated.....	3,504,931	3,504,931			126,806	744,982	744,982		4.70
3	Lexington and Boston.....	2,908,985	2,691,301	217,684	10	72,659	911,692	911,692		2.95
4	Old Colony Street Railway.....	53,658,181	46,321,681	7,331,500	36	122,137	9,997,394	9,296,467	700,927	4.99

¹ For 8 companies only.² Estimated.³ This company failed to make a report.⁴ Includes 2 companies operating part of year.⁵ For 9 companies only, and includes 1 company operating part of year.⁶ For 14 months only.⁷ Not reported.⁸ For 6 months only.

GENERAL TABLES.

359

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.			In city limits.	Outside city limits.		Total.	Passengers.	Employees.	Others.	Killed.	Injured.	Killed.	Injured.	
1 203,390	203,390		18.82				3	1	33			8	1	11		14
2,920	2,920		8.64	No.	6	6										1
34,675	34,675		15.40	No.	8	8	1									2
18,500	18,500		11.08	No.	12	12	1		2							3
				No.	5											4
13,423	13,423		42.23	No.	10	25	1		2							5
8,760	8,760		34.22	No.	10	25		1								6
				No.												7
27,010	27,010		24.44	No.	15	15										8
9,855	9,855		7.73	No.	6	6										9
				Yes	8	25			29							10
88,247	88,247		16.54	No.	12	12										11
				No.	5											12
*3,006,531	3,003,976	2,555	13.21				2	9	51	1	38	1	1	7		12
6,570	6,570		22.83	No.	8	15										1
				Yes	10	10		2	20							2
5,840	5,110	730	34.00	No.	6	8	1									3
29,200	29,200		9.59	No.	12	15		1	5							4
101,088	101,088		23.25	No.	6	6			15							5
				No.	8	20										6
2,628,000	2,628,000		12.62	Yes	12	20		(7)	(7)							7
36,825	35,000	1,825	15.48	No.	10	45		2	1							8
94,528	94,528		14.23	No.	12	12										9
				No.	8	8		4								10
14,480	14,480		17.78	No.	10	15			6							11
90,000	90,000		15.97	No.	8	10	1		4							12
2,025,648	2,025,648		27.32				4	27	1,230	1	865			64	26	301
22,889	22,889		15.72	No.	12		2									1
10,220	10,220		12.54	No.	6											2
235,872	235,872		24.45	No.	10			1	24							3
93,072	93,072		26.92	No.	15			1	8							4
1,119,396	1,119,396		26.32	Yes	15		1	16	1,151							5
467,784	467,784		33.02	No.	15		1	6	42							6
18,615	18,615		11.91	No.	6	6										7
57,800	57,800		25.09	No.	12			3	5							8
10 456,023	379,444	76,579	32.97				11	4	26	1	26					3
55,440	55,440		21.79	No.	6	9										1
13,140	8,760	4,380	33.74	Yes	6	20			3							2
31,095	29,988	1,107	38.44	No.	8											3
12,522	10,962	1,560	39.75	Yes	8	12	1		6							4
48,545	48,545		15.02	No.	6											5
19,876	19,710	166	27.74	No.	8											6
41,245	6,205	35,040	8.43	Yes	12	20										7
				No.	6											8
				No.	6											9
95,730	91,980	3,750	46.07	No.	7	15	2	1	1							10
6,205	6,205		22.55	Yes	4											11
				Yes	10	15	3	1	16							12
34,367	29,445	4,922	51.17	Yes		13		2								13
70,115	46,355	23,760	29.56	Yes	6		1									14
				Yes	6		1									15
11 5,869	5,800	69	10.74	Yes	7	12										16
9,464	7,639	1,825	21.55	Yes	8	20	1									17
12,410	12,410		49.15	No.	9		1									18
																19
12 67,517	67,283	234	26.65				6		1,335							635
				Yes	12	14	3		11,323							1
				Yes	6	8	1		2							2
				Yes	6	12	1									3
				Yes	8	8										4
12 674	2,674		77.35	No.	5	12										5
42,705	42,705		15.05	No.	12	14										6
				No.	8		1									7
5,942	5,929	13	19.81	No.	12				1							8
9,353	9,183	210	67.71	No.	12				6							9
6,808	6,792	11	30.10	No.		15			3							10
11 11,287,251	11,244,744	42,507	38.11				31	82	4,142	18	2,854	9		238	55	1,050
21,900	21,900		19.70	Yes	10	15		1	2							1
				Yes	8				1							2
				No.	10		5	2	8							3
1,013,309	1,013,309		45.71	Yes	8	28	5	13	445	4	281	1		69	8	95

* Includes 1 company operating part of year.

† For 14 companies only, and includes 1 company operating part of year.

‡ For 10 months only.

§ For 5 companies only, and includes 1 company operating part of year.

|| Persons killed not reported separately.

|| For 24 months only.

|| Includes 11 companies operating part of year.

|| For 46 companies only, and includes 7 companies operating part of year.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.				Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE			Fare passengers per car mile.
		Total.	Fare.	Transfer.	Total.			Passenger cars.	Freight, mail, express, and other cars.		
MASSACHUSETTS—Continued.											
5	Boston and Northern	76,572,458	69,299,473	7,272,985	61	157,363	14,419,352	14,139,780	279,572	4.90	
6	Boston Elevated Railway	337,484,811	222,484,811	115,000,000	38	549,427	45,999,999	45,772,836	227,163	4.86	
7	Lowell and Boston	272,776	272,776			27,891	153,061	153,061		1.78	
8	New York, New Haven and Hartford Railroad	1,039,810	1,039,810			26,438	1,325,834	1,325,834	2,802	3.22	
9	Blue Hill Street Railway	561,805	493,333	68,472	1	43,658	154,840	154,840		3.19	
10	Huonac Valley	2,204,066	2,204,066			117,864	586,771	586,771		3.76	
11	Concord, Maynard and Hudson	952,054	927,384	24,670	2	69,105	264,612	264,612		3.50	
12	Conway Electric Railway	58,702	58,702			9,244	29,504	29,504		1.99	
13	Cottage City and Edgartown	82,919	82,919			15,159	14,862	14,862		5.58	
14	Norfolk Western Railway	510,761	510,761			54,049	179,753	179,753		2.84	
15	Greenfield and Deerfield	53,626	53,626			6,788	29,611	29,611		1.81	
16	Providence and Fall River	859,039	858,539	500	1	68,519	219,564	219,564		3.91	
17	Dartmouth and Westport	2,985,474	2,623,831	311,643	2	131,323	361,388	361,388		7.26	
18	Fitchburg and Leominster	4,442,120	3,765,154	676,966	3	118,850	872,682	859,890	12,792	4.35	
19	Framingham Union Street Railway	902,838	782,936	119,902	2	112,168	148,234	148,234		5.28	
20	Gardner, Westminster and Fitchburg	1,099,752	1,098,990	762	1	68,473	284,716	284,716		3.86	
21	Greenfield and Turners Falls	1,050,859	1,050,859			69,732	224,770	224,770		4.68	
22	Haverhill and Southern New Hampshire	210,671	210,671			34,764	97,215	97,215		5.66	
23	Haverhill, Georgetown and Danvers	601,597	601,597			91,987	145,316	145,316		4.14	
24	Haverhill and Amesbury	2,458,772	2,328,243	130,529	3	78,897	511,897	511,897		4.55	
25	Holyoke Street Railway	6,832,568	6,336,300	496,268	8	144,985	1,495,000	1,496,000	424	4.24	
26	Lawrence and Reading	884,268	834,268			64,672	268,113	265,615	2,498	3.14	
27	Lawrence and Methuen	201,630	201,630			30,139	28,490	28,490		7.08	
28	Middleton and Danvers	327,699	327,699			13,497	74,318	74,118	200	4.42	
29	Norfolk and Bristol	823,989	803,412	20,577	2	38,167	321,123	321,123		2.50	
30	Marlboro Street Railway	1,470,521	1,283,811	186,710	3	81,254	302,987	302,987		4.24	
31	Marlboro and Westboro	672,614	672,614			48,529	167,527	167,527		4.08	
32	Medfield and Medway	477,346	477,346			42,431	203,782	203,782		2.34	
33	Middleboro, Wareham and Buzzards Bay	860,850	860,850			28,946	347,319	347,319		2.48	
34	Milford, Attleboro and Woonsocket	1,492,206	1,484,950	7,256	1	48,354	552,800	552,800		2.69	
35	Milford and Uxbridge	2,830,521	2,830,521			78,582	713,139	713,139		3.97	
36	Natick and Cohituate	1,611,446	1,611,446			85,715	461,879	461,879		3.49	
37	South Middlesex Street Railway	1,445,338	1,445,338			73,479	381,289	379,489	1,800	3.81	
38	Union Street Railway	7,610,228	6,160,597	1,449,631	5	201,064	1,334,311	1,334,311		4.62	
39	New Bedford and Onset	966,998	966,998			44,236	239,372	238,388	984	4.06	
40	Citizens Electric Railway	2,156,163	1,927,661	228,502	12	81,508	399,285	399,285		4.83	
41	Georgetown, Rowley and Ipswich	898,678	862,678	36,000	1	45,912	267,856	267,856		3.22	
42	Commonwealth Avenue	1,738,401	1,547,483	190,918	5	111,170	423,085	423,085		3.66	
43	Wellesley and Boston	1,387,072	963,098	423,974	3	111,212	271,826	271,826		3.54	
44	Newton and Boston	1,721,650	970,693	750,957	3	63,777	492,502	492,502		1.97	
45	Newton Street Railway	2,849,316	2,213,223	636,093	5	114,319	564,475	564,475		3.92	
46	Northampton Street Railway	3,176,219	2,848,901	327,318	8	108,488	767,328	737,398	29,930	3.86	
47	Northampton and Amherst	1,009,895	1,009,895			68,052	292,045	292,045		3.46	
48	Haverhill and Andover	2,118	2,118			1,177	114,125	14,125		1.15	
49	Norton and Taunton	940,075	940,075			31,087	350,499	350,499		2.68	
50	Atoll and Orange	770,054	770,054			105,199	140,368	140,368		5.49	
51	Pittsfield Electric	2,237,793	2,237,793			105,656	560,147	560,147		4.00	
52	Plymouth and Sandwich	69,441	69,441			10,918	39,927	39,927		1.74	
53	Brockton and Plymouth	1,835,693	1,799,709	35,984	1	75,618	441,606	441,606		4.08	
54	Norwood, Canton and Sharon	159,491	159,491			25,933	89,704	89,704		1.78	
55	Shelburne Falls and Coleraine	166,137	166,137			23,700	54,254	54,254		3.06	
56	Southbridge and Sturbridge	619,384	619,384			77,326	148,006	148,006		4.18	
57	Hampshire Street Railway	60,335	60,335			13,202	21,075	21,075		2.86	
58	Springfield Street Railway	19,278,987	16,878,905	2,400,082	24	183,407	4,342,075	4,342,075		3.89	
59	Springfield and Eastern	1,975,227	1,900,021	75,206	1	62,378	562,742	562,742		3.38	
60	Stoughton and Randolph	147,541	147,541			17,884	64,307	64,307		2.29	
61	East Taunton Street Railway	694,450	694,450			60,810	157,335	157,335		4.41	
62	Bristol County	1,010,959	990,959	20,000	2	57,083	387,425	387,425		2.56	
63	Templeton Street Railway	749,045	749,045			40,731	246,397	246,397		3.04	
64	Marthas Vineyard	21,742	21,742			19,765	5,807	5,807		3.74	
65	Upton Street Railway	739,582	39,532			14,862	717,435	17,435		2.27	
66	Reading, Wakefield and Lynnfield	33,057	33,057			8,043	13,734	13,734		2.41	
67	Hampshire and Worcester	431,604	431,604			35,611	137,450	137,450		3.14	
68	Warren, Brookfield and Spencer	1,257,837	1,257,837			62,579	363,328	363,328		3.46	
69	Webster and Dudley	582,559	545,248	37,311	3	89,582	139,249	139,249		3.92	
70	Woronoco Street Railway	1,510,731	1,298,316	222,415	1	105,169	398,875	398,875		3.23	
71	Linwood Street Railway	200,655	200,655			105,608	35,767	35,767		5.61	
72	Worcester Consolidated	29,327,285	24,522,299	4,804,986	1	185,116	4,769,386	4,769,386		5.14	
73	Worcester and Blackstone Valley	1,094,724	1,094,724			62,591	286,206	286,206		3.82	
74	Worcester and Southbridge	798,012	798,012			30,634	111,501	111,501		7.16	
75	Worcester and Webster	987,890	987,890			55,189	311,687	311,687		3.17	
MICHIGAN.											
Total for state		110,440,783	113,916,992	26,523,791	116	111,376	33,046,839	32,333,464	713,375	3.52	
1	Adrian Street Railway	259,891	259,891			64,013	100,000	100,000		2.60	
2	Bay Cities Consolidated	2,602,050	1,986,952	615,088	1	85,278	321,064	321,064		2.16	
3	Benton Harbor and St. Joseph	1,198,826	1,198,826			114,174	337,000	337,000		3.56	
4	Detroit United Railway	92,025,136	71,891,137	20,133,999	76	188,542	18,016,870	17,835,540	181,330	4.03	
5	Detroit and Port Huron Shore Line	3,251,522	3,032,522	219,000	5	22,909	1,786,802	1,727,802	71,000	1.76	
6	Detroit, Ypsilanti, Ann Arbor and Jackson	1,944,061	1,944,061			21,265	1,590,601	1,490,724	99,877	1.30	
7	Escanaba Electric Railway	608,800	602,800	6,000	1	79,212	173,584	173,584	1,520	3.47	
8	Grand Rapids Railway	16,772,587	12,806,529	3,966,058	17	229,261	3,020,127	2,991,835	28,292	4.29	
9	Grand Rapids, Grand Haven and Muskegon	860,081	860,081			11,212	507,891	439,171	68,710	1.34	
10	Grand Rapids, Holland and Lake Michigan	860,000	860,000			12,464	860,712	722,712	138,000	1.19	
11	Houghton County Street Railway	3,182,408	3,132,249	50,159	1	141,347	564,136	564,136		5.55	
12	Twin City General Electric	398,410	398,410			86,611	30,660	30,660		12.99	
13	Negaunee and Ishpeming	602,980	602,980			128,567	91,600	91,600		6.58	
14	Jackson and Suburban Traction	1,758,089	1,604,388	253,651	3	72,816	546,130	546,130		2.75	
15	Michigan Traction	4,023,997	4,023,997			91,872	1,094,462	1,094,462		3.68	
16	Lansing City Electric	1,068,170	854,540	213,630	2	108,170	346,750	346,750		2.46	
17	Manistee, Flier City and Eastlake	184,000	775,000	65,000	1	51,667	260,000	260,000		2.98	

1 For 6 months only.

2 For 3 months only.

3 For 10 months only.

4 For 14 months only.

5 For 10 months only.

6 2-cent transfers.

7 For 6 months only.

8 For 2 months only.

GENERAL TABLES.

361

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.				Fare passengers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.	In city limits.			Outside city limits.	Total.		Passengers.		Employees.		Others.				
							Killed.		Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.		
1,559,050	1,559,050		44.45	Yes	8	28	4	12	729	2	541		54	10	134	5	
5,990,000	5,990,000	40,000	37.39	Yes	7	12		21	2,085	6	1,412	4	61	11	622	6	
13,102	13,102		20.82	No.	8	20			4		3		1			7	
18,054	18,054		27.33	Yes	15											8	
56,640	56,640		38.91	No.	10	15	1	2	3		3			1		9	
23,000	23,000		40.32	No.	12	15					3					10	
8,670	8,670		6.77	Yes	10	10										11	
21,204	1,204		68.87	No.	9											12	
16,445	16,445		31.06	No.	12				2		1				1	13	
45,210	5,210		10.29	No.	10	10										14	
				Yes	21	30			1		1					15	
				Yes	8	12	1		9		5		1		3	16	
106,377	104,270	2,107	36.11	No.	10	10	1		50		41				9	17	
14,823	14,823		52.62	Yes	8	15		1	2		1			1	1	18	
32,320	32,320		34.00	No.	10	10	1		19		12		5		4	19	
45,720	45,720		22.98	Yes	10	10	1		6		6					20	
				No.	8	15										21	
				No.	8	15			3							22	
62,000	62,000		37.55	Yes	7	15			21		15		3		3	23	
166,331	166,331		38.09	Yes	8	15	2	1	26	1	25		1			24	
18,451	18,451		45.22	No.	12	25			1						1	25	
				No.	8	25										26	
6,668	6,668		19.15	No.	10	28										27	
29,528	29,528		27.21	No.	8	12			9		6		3			28	
30,296	30,296		42.37	No.	10	15		1	144		139	1	3		3	29	
19,005	19,005		25.12	No.	12	8			1		1		2			30	
				No.	20			2	1		2				1	31	
26,812	26,812		55.38	No.	18		1		4		1		2	2	1	32	
86,670	86,670		32.58	Yes	8	15	1	1	13		9				2	33	
40,808	40,808		39.49	Yes	8	12								1		34	
40,785	40,785		35.44	Yes	8	12	1		12		6		3		3	35	
				Yes	8	12		3	21	1	13		2	2	6	36	
				No.	16				6		6					37	
43,200	43,200		44.62	Yes	8	16	1	1	11		6		1	1	2	38	
				Yes	8	12			3		2				1	39	
				No.	8				12		11		1			40	
				No.	8				4		2					41	
				No.	8			2	22	1	16			1	6	42	
				No.	8				17		12				5	43	
74,281	73,881	400	38.36	Yes	10	15	1		39		35		2		2	44	
32,850	32,850		30.74	Yes	12				4						4	45	
1,867	1,867		1.12	No.	8	28										46	
				No.	12			3	1	1						47	
20,380	20,380		37.77	No.	6	10	1		2						1	48	
54,800	54,800		40.84	No.	10	15		1	11				2	1	9	49	
				No.	12											50	
				Yes	10	15	1		11		9				2	51	
				No.	12				2		2					52	
8,840	8,840		18.79	Yes	10	15			1		1					53	
18,900	18,900		32.77	Yes	10	15	1									54	
22,900	2,900		20.81	No.	10											55	
615,000	615,000		27.45	Yes	10	12		1	148	1	86		15		47	56	
54,900	54,900		34.61	Yes	6	15	1	2	25		24			2	1	57	
				Yes	8	12			10		9					58	
				No.	8	12			2							59	
				No.	8	14		1						1		60	
				Yes	8	12										61	
				No.	8	8										62	
				No.	8	8										63	
				No.	9	8										64	
1,027	1,027		32.19	No.	12	28										65	
				No.	6	25	1									66	
45,425	45,425		27.69	No.	10	18	1	2	11		5		1	2	5	67	
26,290	26,290		20.75	No.	6	15	1									68	
49,600	49,600		25.97	Yes	8	15			5		1		4			69	
				No.	6	20										70	
705,889	705,889		34.74	Yes	6	15	1	8	145		86	2	2	6	57	71	
32,850	32,850		33.32	No.	8	15		1	7		5			1	2	72	
8,942	8,942		19.24	No.	10	35	1									73	
35,910	35,910		27.51	Yes	7	15			3		1				2	74	
																75	
112,325,843	2,267,069	58,754	40.72				14	55	778	7	559	4	45	44	174		
12,775	12,775		20.34	No.	7											1	
97,800	97,800		20.32	Yes	12		1	1	12		12			1		2	
				No.	12	28										3	
1,610,891	1,567,091	43,800	45.88	Yes	15	45		27	527	6	407	1	11	20	109	4	
				Yes	15	30		4	72		61	1	3	3		5	
				Yes	15	40		1	28		25	1	3			6	
20,520	20,520		29.38	No.	6	22		1	2		2			1		7	
350,400	341,640	8,760	37.48	Yes	15	20	2	6	90		32	1	21	5	37	8	
40,482	35,892	4,590	16.44	Yes	6	45	1									9	
				No.	12	50		3	3				1	3	2	10	
				No.	7	11	1	3	8		1		1	3	6	11	
				No.	4	6										12	
14,000	14,000		43.07	No.	12		2									13	
				No.	10	20	1	2	6		5			2	1	14	
				Yes	8	20	1	3	12		5			3	6	15	
52,560	52,560		16.26	No.	12	12			1		1					16	
45,900	45,900		16.88	Yes	8	10	1	1	1	1	1					17	

* For 2½ months only.

† Includes 5 companies operating part of year.

‡ For 11 companies only, and includes 4 companies operating part of year.

§ For 11 months only.

|| For 9 months only.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
MICHIGAN—Continued.										
18	Marquette and Presque Isle	382,797	373,672	9,125	2	53,382	131,400	131,400		2.84
19	Menominee Light, Railway and Power	529,764	529,764		3	78,961	176,588	176,588		3.00
20	Toledo and Monroe	518,565	518,565			23,657	318,248	292,102	26,146	1.78
21	Muskegon Traction and Lighting	¹ 1,779,293	1,656,762	123,531	1	108,932	² 547,334	534,504	12,830	3.10
22	Detroit, Plymouth and Northville	236,600	236,600			13,918	188,249	188,249		1.26
23	Owosso and Corunna Electric	299,409	299,409			69,308	104,043	104,043		2.88
24	Saginaw Valley Traction	4,707,397	3,838,827	868,570	3	99,323	1,319,058	1,233,588	85,470	3.11
MINNESOTA.										
	Total for state	90,698,793	73,236,612	17,462,181	77	216,567	15,692,887	15,092,887		4.67
1	Interstate Traction	240,000	240,000			76,433	61,240	61,240		3.92
2	Duluth-Superior Traction	10,908,849	9,178,517	1,726,332	13	129,823	2,258,894	2,258,884		4.06
3	Twin City Rapid Transit	78,597,815	63,009,967	15,587,858	62	251,016	12,895,343	12,895,343		4.89
4	Benton Power and Traction	416,841	380,341	36,500	1	43,919	185,420	185,420		2.05
5	Winona Railway and Light	540,288	427,797	112,491	1	91,999	292,000	292,000		1.47
MISSISSIPPI.										
	Total for state	³ 3,127,940	3,101,015	26,925	3	122,570	² 923,990	923,990		3.36
1	Greenville Light and Car	147,629	147,629			147,629	87,600	87,600		1.09
2	Jackson Railway, Light and Power	951,895	951,895			178,257	279,552	279,552		3.41
3	Meridian Light and Railway	565,425	538,500	26,925	3	94,308	118,800	118,800		4.53
4	Natchez Railway and Power	⁴ 274,702	274,702			61,045	⁵ 67,733	67,733		4.06
5	Vicksburg Railroad, Power and Manufacturing	1,188,289	1,188,289			135,804	370,305	370,305		3.21
MISSOURI.										
	Total for state	290,092,823	211,808,737	78,284,086	342	279,291	55,762,991	55,326,272	436,719	3.83
1	Citizens Street Railway	16,000	16,000			9,143	14,600	14,600		1.10
2	Carrollton Electric Railway	53,107	53,107			28,248	16,790	13,140	6,650	4.04
3	Clinton Street Railway	3,258	3,258			2,413	1,565	1,565		2.08
4	Hannibal Railway and Electric	450,000	450,000			105,882	120,450	120,450		3.72
5	Southwest Missouri Electric Railway	2,591,250	2,500,000	91,250	4	68,287	962,484	955,284	7,200	2.62
6	Metropolitan	84,250,098	57,148,083	27,112,015	80	315,317	16,032,864	15,979,864	53,000	3.58
7	Missouri Water, Light and Traction	261,000	261,000			63,350	115,340	115,340		2.26
8	St. Joseph Railway, Light, Heat and Power	11,426,480	8,534,278	2,892,202	8	242,796	2,198,630	2,198,630		3.88
9	St. Louis Transit	167,413,796	122,063,877	45,349,919	235	338,230	29,602,974	29,378,488	224,486	4.15
10	St. Louis and Suburban	10,867,345	9,511,483	1,355,862	3	258,324	2,844,487	2,761,612	82,875	3.44
11	St. Louis and Meramec River	8,191,877	7,388,798	803,079	2	209,544	2,390,773	2,235,259	155,514	3.31
12	St. Louis and Kirkwood	2,278,447	876,188	403,259	4	35,050	531,983	521,989	9,994	1.68
13	St. Louis, St. Charles and Western	¹ 1,027,950	1,027,950			64,247	377,596	377,596		2.72
14	Railway and Electric of Sedalia	301,500	275,000	26,500	3	45,380	141,893	141,893		1.94
15	Kickapoo Transit	72,000	72,000			25,714	52,600	52,600		1.37
16	Springfield Traction	1,878,715	1,628,715	250,000	3	99,921	457,962	457,962		3.56
MONTANA.										
	Total for state	6,917,002	6,858,502	58,500	3	108,503	1,354,822	1,313,942	40,880	5.22
1	Anaconda Copper Mining	799,116	799,116			118,388	122,482	122,482		6.52
2	Bozeman Street Railway	39,711	39,711			15,884	16,500	16,500		2.41
3	Butte Electric Railway	4,731,000	4,731,000			189,543	807,380	766,500	40,880	6.17
4	Great Falls Street Railway	997,936	939,436	58,500	3	78,944	300,460	300,460		3.13
5	Helena Power and Light	349,239	349,239			20,423	108,000	108,000		3.23
NEBRASKA.										
	Total for state	² 27,619,504	22,228,325	5,391,179	40	195,569	³ 6,273,945	6,238,210	35,735	3.56
1	Lincoln Traction	4,013,804	3,573,213	440,591	3	96,573	1,191,159	1,155,424	35,735	3.09
2	Nebraska City Street Railway	28,980	28,980			9,318	29,200	29,200		.99
3	Omaha Street Railway	23,408,928	18,540,000	4,868,928	36	257,500	5,007,074	5,007,074		3.70
4	Metropolitan Cable Railway	⁴ 167,792	86,132	81,660	1	55,569	⁵ 46,512	46,512		1.85
NEW HAMPSHIRE.										
	Total for state	12,234,120	11,304,908	929,212	5	67,432	3,214,879	3,214,611	268	3.52
1	Concord Street Railway	1,510,856	1,510,856			118,871	451,372	451,372		3.35
2	Chester and Derry	233,218	233,218			29,709	57,100	57,100		4.08
3	Exeter, Hampton and Amesbury	3,300,220	3,227,220	73,000	4	41,465	953,152	953,152		3.39
4	Keene Electric Railway	474,547	474,547			72,783	158,415	158,415		3.00
5	Laconia Street Railway	436,171	436,171			49,174	149,924	149,924		2.91
6	Manchester Street Railway	5,427,947	4,571,735	856,212	1	132,169	1,084,560	1,084,560		4.22
7	Portsmouth Electric Railway	851,161	851,161			44,147	300,356	360,088	268	2.36
NEW JERSEY.										
	Total for state	¹⁰ 228,082,103	188,976,899	39,105,204	118	219,414	¹⁰ 85,372,346	35,355,733	16,613	5.35
1	West Jersey and Seashore	5,206,304	5,206,304			273,584	1,438,770	1,438,770		3.62
2	Bridgeton and Millville	1,781,980	1,698,227	83,753	1	48,521	428,350	428,350		3.96
3	Brigantine Transportation	¹² 79,075	79,075			10,203	¹² 32,890	32,890		2.40
4	Camden, Gloucester and Woodbury	3,750,000	3,500,000	250,000	1	141,243	665,672	665,672		5.26
5	Camden and Suburban	9,586,833	8,217,072	1,369,761	33	121,178	2,501,430	2,495,406	6,024	3.29
6	Cape May, Delaware Bay and Sewells Point	366,206	366,206			29,461	74,592	74,592		4.91
7	Elizabeth, Plainfield and Central Jersey	4,961,474	4,706,371	255,103	1	76,526	1,802,273	1,802,273		2.61
8	New Jersey and Hudson River Railway and Ferry	1,649,843	1,649,843			105,759	326,075	326,075		5.06

¹ Estimated.² For 10 months only.³ Includes 1 company operating part of year.⁴ For 3 companies only, and includes 1 company operating part of year.⁵ For 5 months only.⁶ Not reported.

GENERAL TABLES.

363

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.			In city limits.	Outside city limits.		Total.		Passengers.		Employees.		Others.		
								Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	
				No.	9											18
				No.	20		1	1	1					1	1	19
				No.	10	50		1	1					1	1	20
68,417	66,813	1,604	24.78	No.	8		1	1	5		2		1	1	2	21
				No.	20	20		1	1							22
12,098	12,098		24.75	No.	16	16	1									23
				No.	8	20	1		9		4		2		3	24
1,699,468	1,699,468		43.08				5	11	1,653		795	3	200	8	656	
6,804	6,804		35.27	No.	8											1
267,954	267,954		34.26	Yes	8			2	80		32		19	2	29	2
1,366,850	1,366,850		46.10	Yes	8	27	4	9	1,573		763	3	181	6	629	3
26,280	26,280		14.47	No.	12	15										4
32,000	32,000		13.37	No.	12		1									5
83,092	83,092		29.06				2	2	24		1	1	8	1	15	
31,409	31,409		30.30	No.	12				14				8		6	1
				No.	20	25										2
9,240	9,240		29.73	No.	12		1	2	1		1			1	1	3
42,443	42,443		28.00	No.	10		1		1		1				8	4
									8							5
5,261,037	5,210,997	50,040	39.53				6	116	6,274	16	2,944	10	612	90	2,718	
				No.	4											1
				Yes	6	20										2
14,600	14,600		30.82	No.	5											3
				No.	10		1	1	2		2			1		4
1,788,590	1,782,590	6,000	32.06	No.	10	30	2	1	11		4		1		6	5
				Yes	20	30	1	21	2,181	2	1,758	1	189	18	224	6
				No.	10											7
132,646	132,646		64.34	Yes	10	20	1	2	61		28		9	2	24	8
3,009,400	2,974,003	35,797	41.04	Yes	15	15		77	3,900	12	1,100	9	400	56	2,400	9
158,027	153,423	4,604	62.00	Yes	15	15		6	54		23		6	6	26	10
127,265	124,181	3,084	59.50	Yes	15	15		6	45	1	17		4	5	24	11
30,109	29,554	555	29.61	No.	15	15			6		4		1		1	12
				No.	17			2	1	1	1			1		13
				No.	6	15	1		2						2	14
				No.	5	5										15
				No.	15	15			11		7		2		2	16
55,070	55,070		23.40				3	2	19		13		1	2	5	
				No.	6	25	1	1	3		1		1	1	1	1
				Yes	12											2
29,150	29,150		32.23	No.	8	15	1		13		9				4	3
25,920	25,920		13.47	No.	10	15	1		3		3					4
				No.	8	15		1						1		5
								3	211	1	184		9	2	18	
				Yes	10	17			60		49		9		2	1
				No.	15											2
				Yes	10		3	150	1	135				2	15	3
				No.	6			1							1	4
161,145	161,145		32.52				5	2	62		42		6	2	14	
				No.	8		1	1	1				1	1		1
7,665	7,665		30.43	Yes	8		1									2
				Yes	5	12	2	1	24		13			1	11	3
				Yes	8	12										4
118,840	118,840		23.15	No.	8											5
134,640	134,640		33.96	No.	8	15	1		31		27		4			6
				Yes	14	25			6		2		1		3	7
700,478	697,838	2,640	28.36				5	47	3,057	6	1,904	4	120	37	1,033	
				Yes	12	17		1	19		9			1	10	1
50,312	50,312		33.75	Yes	8	20	1		1		1					2
				No.	20				3		3					3
				Yes	8	15		3	22	2	11		3	1	8	4
319,066	318,298	768	25.82	No.	8	13	1	4	212	1	147	2	29	1	36	5
				No.	6	15										6
				No.	10	12			42		30		2		10	7
				No.	8	15		1	37		28		9	1		8

⁷ For 7 companies only.

⁸ For 2 companies only.

⁹ For 3 companies only.

¹⁰ Includes 4 companies operating part of year.

¹¹ For 7 companies only, and includes 1 company operating part of year.

¹² For 3½ months only.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
NEW JERSEY—Continued.										
9	Jersey City, Hoboken and Paterson	47,964,287	37,451,408	10,512,879	18	266,444	6,859,229	6,859,229		5.46
10	North Jersey Street Railway	128,605,253	103,624,753	24,980,500	46	418,550	15,324,609	15,324,609		6.76
11	Jersey Central Traction	171,143	65,297	5,846	1	20,929	129,704	29,704		2.20
12	Monmouth County Electric	920,885	920,885			90,638	318,794	318,794		2.89
13	Atlantic Coast Electric Railroad	3,743,541	3,737,541	6,000	1	157,835	801,893	801,893		4.66
14	Millville Traction	636,177	629,401	6,776	1	47,181	185,208	185,208		3.46
15	Mt. Holly Street Railway	16,800	16,800			13,770	8,138	8,138		2.06
16	Middlesex and Somerset	3,921,701	3,812,201	109,500	1	76,244	1,116,408	1,116,408		3.41
17	Ocean City Electric Railroad	248,926	248,926			33,190	81,500	81,500		7.90
18	Orange and Passaic Valley	1,950,908	1,785,908	165,000	1	180,577	452,670	452,670		8.95
19	South Orange and Maplewood	471,206	416,820	54,386	1	77,189	140,901	140,312	589	2.97
20	Raritan Traction	880,128	880,128			97,144	297,308	297,308		2.96
21	Point Pleasant Traction, Electric Light and Power	98,000	98,000			42,982	82,666	82,666		3.00
22	Newark and Hackensack	830,263	830,263			55,885	441,240	441,240		1.88
23	Trenton Street Railway	9,189,941	7,834,241	1,305,700	12	179,684	1,790,417	1,790,417		4.38
24	Camden and Trenton	863,456	863,456			27,853	161,096	161,096		5.36
25	Trenton, Lawrenceville and Princeton	228,410	228,410			22,795	99,833	89,833	10,000	2.54
26	Orange Mountain Traction	109,363	109,363			78,116	10,680	10,680		10.24
NEW MEXICO.										
	Total for territory	78,000	73,000			34,762	61,320	61,320		1.19
1	Albuquerque Street Railroad	78,000	73,000			34,762	61,320	61,320		1.19
NEW YORK.										
	Total for state	1,424,915,703	1,144,491,509	280,424,194	1,157	407,305	251,312,176	234,279,043	17,033,133	4.89
1	Albany and Hudson Railway and Power	1,055,990	1,055,990			23,730	637,892	615,060	22,832	1.72
2	United Traction	28,796,923	26,417,076	2,379,847	12	337,254	7,707,050	7,449,410	257,640	3.55
3	Hudson Valley Railway	4,408,761	4,246,883	161,878	7	31,670	1,665,461	1,507,770	147,691	2.82
4	Troy and New England	271,765	271,765			27,176	159,348	139,348	20,000	1.95
5	Amsterdam Street Railroad	1,094,542	1,028,091	66,451	1	179,423	330,540	330,540		3.11
6	Auburn City Railway	2,112,569	1,718,809	393,750	1	137,395	496,627	496,627		3.46
7	Auburn Interurban Electric	355,334	355,334			49,977	92,928	91,120	1,808	3.90
8	Ballston Terminal Railroad	73,189	73,189			4,879	87,130	51,536	35,594	1.42
9	Binghamton Railway	5,031,090	4,219,142	811,948	2	114,775	824,050	824,050		6.12
10	International Railway	87,239,898	83,224,321	24,015,077	128	279,977	14,791,144	14,596,888	196,256	4.33
11	Crosstown Street Railway	15,693,288	10,912,560	4,780,728	41	111,615	2,694,868	2,694,868		4.05
12	Buffalo and Depew	211,249	211,249			14,361	210,029	206,119	3,910	1.02
13	Buffalo, Hamburg and Aurora	109,288	91,788	17,500	1	6,675	174,160	74,160		1.24
14	Ontario Light and Traction	138,667	138,667			46,222	73,567	73,567		1.89
15	Catskill Electric Railway	176,595	176,595			60,895	100,134	100,134		1.76
16	Cohoes City Railway	454,229	390,782	73,447	1	69,966	209,724	209,724		1.82
17	Cortland County Traction	745,210	719,626	25,584	3	71,676	208,239	196,616	11,623	3.66
18	Corning and Painted Post	686,396	670,407	15,989	1	113,628	173,638	173,638		3.86
19	Dunkirk and Fredonia	479,959	479,959			127,989	89,723	89,583	140	5.36
20	Dunkirk and Point Gratiot	201,811	201,811			62,096	20,980	20,980		9.62
21	Elmira Water, Light and Railroad	4,155,206	2,511,146	1,644,060	7	92,186	1,165,824	1,165,824		2.15
22	Ocean Electric Railway	109,180	109,180			104,980	16,252	16,252		6.72
23	Citizens Street Railway	747,304	747,304			106,758	167,421	167,421		4.46
24	Fonda, Johnstown and Gloversville	1,406,160	1,406,160			73,969	326,988	326,988		4.30
25	Lake Ontario and Riverside	45,335	45,335			48,591	13,140	13,140		3.45
26	Geneva, Waterloo, etc., Traction	1,421,391	1,378,629	42,762	1	77,669	411,251	411,251		3.35
27	Mountain Lake Electric	80,912	80,912			17,980	42,164	42,164		1.92
28	Bennington and Hoosick Valley	766,899	766,899			46,422	263,125	258,125	5,000	2.97
29	Hornellsville Electric Railway	318,096	296,909	21,187	2	58,562	180,210	180,210		1.65
30	Hornellsville and Canastota	340,941	340,941			63,966	102,730	95,212	7,518	3.58
31	Huntington Railroad	222,461	222,461			69,737	51,335	51,335		4.33
32	Ithaca Street Railway	2,218,964	1,893,846	325,118	1	246,596	433,556	433,556		4.37
33	Jamestown Street Railway	3,143,655	2,608,361	535,294	6	125,523	662,911	661,021	1,890	3.95
34	Kingston Consolidated	2,285,286	2,217,334	67,952	5	242,067	552,351	552,351		4.01
35	Lewiston and Youngstown Frontier	57,808	57,808			6,645	69,515	61,515	8,000	.94
36	Lima-Honeoye Light and Railroad	24,736	24,736			4,794	25,404	21,900	3,504	1.13
37	Middletown-Goshen Electric	1,003,310	951,251	52,059	4	74,085	378,106	363,806	14,300	2.61
38	New York and Long Island Traction	1,665,499	1,578,919			7,278	16,773	16,773		3.90
39	Orange County Traction	1,757,843	1,578,919	178,924	3	95,750	448,077	431,649	16,428	3.66
40	New Paltz and Poughkeepsie	158,613	158,613			17,110	71,640	71,640		2.21
41	Interurban	403,582,402	288,007,915	115,524,487	318	1,434,088	44,380,922	44,233,328	147,594	6.51
42	Central Crosstown	17,657,420	11,666,613	5,990,807	34	833,330	1,577,158	1,577,158		7.40
43	Fulton Street Railroad	1,234,865	869,948	364,917	5	460,290	108,266	108,266		8.04
44	Thirty-fourth Street Crosstown	17,668,271	9,113,371	8,554,900	11	1,627,388	1,167,952	1,167,952		7.80
45	Twenty-eighth and Twenty-ninth Street Crosstown	6,125,513	3,610,197	2,515,316	12	474,402	551,534	551,534		6.55
46	Third Avenue Railroad	52,709,412	44,218,326	8,491,087	8	1,612,630	6,707,446	6,707,446		6.59
47	Forty-second Street, Manhattanville and St. Nicholas Avenue	20,671,950	16,470,115	4,201,835	8	534,918	2,996,526	2,996,526		5.50
48	Dry Dock, East Broadway and Battery	17,428,582	14,337,293	3,091,289	15	701,776	2,047,193	2,047,193		7.00
49	Kingsbridge Railway	181,379	140,785	40,594	1	22,526	50,095	50,095		2.81
50	Southern Boulevard Railroad	2,209,926	1,210,091	999,835	4	172,870	456,392	456,292		2.65
51	Yonkers Railroad	7,136,635	4,403,741	2,732,894	4	140,830	1,499,662	1,499,662		2.94
52	Union Railway	38,981,728	22,078,170	16,908,558	12	310,452	6,070,768	6,064,392	6,376	3.64
53	Tarrytown, White Plains and Mamaroneck	1,337,615	1,294,274	43,341	6	69,250	759,784	759,784		1.70
54	Westchester Electric Railroad	8,188,262	4,451,924	3,736,338	11	116,482	1,701,692	1,699,206	2,486	2.62
55	Manhattan Railway (elevated)	215,259,345	215,259,345			1,837,625	56,492,842	45,071,743	11,421,099	4.78
56	Felham Park Railroad	190,000	190,000			126,667	31,000	31,000		6.13
57	City Island Railroad	95,000	95,000			47,500	15,833			6.00
58	Brooklyn Rapid Transit	304,695,311	253,809,609	50,885,702	368	481,877	58,189,766	53,636,529	4,553,237	4.73
59	Coney Island and Brooklyn	36,324,531	30,296,548	6,027,983	5	599,101	6,100,805	6,100,160	645	4.97
60	Van Brunt Street and Erie Basin	1,614,523	1,490,413	124,110	1	496,804	223,348	223,348		6.67
61	New York and Queens County	12,759,449	11,126,586	1,632,863	7	149,410	2,649,115	2,649,115		4.20
62	New York and North Shore	2,483,621	2,483,621			180,146	838,065	838,065		2.98

1 For 6 months only.

* Estimated.

3 For 4 months only.

4 Includes 6 companies operating part of year.

GENERAL TABLES.

365

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passengers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, express, and other cars.			In city limits.	Outside city limits.		Total.	Passengers.	Employees.	Others.	Killed.	Injured.	Killed.	Injured.	
				Yes	8	10		16	368	2	220	2	37	12	121	9
				Yes	10			18	2,206	1	1,396		39	17	771	10
16,516	6,516		10.02	No.	8											11
29,280	29,280		31.45	No.	5	8		1							1	12
				No.	8		1	7								13
				No.	12	15			3				2			14
				No.	6											15
				Yes	8	10		1	7						1	16
				No.	12											17
				No.	8			1	28						1	18
				No.	8											19
				No.	8			2		2						20
				No.	6											21
42,952	42,952		19.33	No.	10	20			2				1			22
246,520	246,520		31.78	Yes	12	20	1	1	86				30		1	23
				No.	8	18			15						2	24
5,832	3,960	1,872	57.68	No.	40											25
				No.	5		1									26
									1							1
				No.	6	6			1							1
1,520,117	1,507,367	12,750	23.08				30	178	1,023	61	577	30	71	87	375	
				Yes	6	60	1	1	3				1			1
				No.	12	25		4	7							2
				Yes	8	18	3	3	10	1	2				4	3
				No.	17		1									4
3,325	38,325		26.83	No.	12	12	1		2							5
				No.	8	12	1		1							6
				No.	10	25		1								7
				No.	8	15			1							8
				Yes	12	20	2	2								9
				Yes	12	40	2	14	45	3	23	2		2	9	10
				No.	12	30		3	12	1	6	1			1	11
				No.	25			1	1							12
				No.	10	30										13
				No.	10				3							14
				No.	8	10										15
				Yes	10	14	1		1							16
				No.	12	12										17
				No.	10				3							18
				No.	12											19
				No.	10	16			6							20
				No.	10											21
				No.	6	8										22
				No.	8	12	1									23
51,100	51,100		27.52	No.	8											24
5,475	5,475		8.28	No.	6											25
4,685	4,685		17.27	No.	8	16	1	1	3						1	26
				No.	8	10										27
				No.	8	15	1	1	1							28
				No.	8											29
				No.	8	12	1									30
				No.	8	14										31
				No.	6	15	1	4								32
				No.	12	15										33
				No.	12											34
				No.	30		1									35
				No.	5	20										36
				No.	8	15	1		1							37
1,710	1,710		38.30	No.	8	25										38
				No.	8	12										39
				No.	12	12			6							40
				No.				9	13							41
				No.				3	76	4						42
				No.	6				8	1						43
				No.	6				1							44
				No.	6				4							45
				No.	6				2							46
				No.	7			2	18							47
				No.	8				6							48
				No.	6			2	2	2						49
				No.	7											50
				No.	8	12		1	4	1						51
				No.	8											52
				No.	8	8		12	28	12						53
				No.	8			2	2	1						54
				No.	8	12		4	7	4						55
				No.	18			14	15	4						56
				No.	6											57
				No.	6											58
				No.	10			60	574	17	324					59
				No.	8			8	3	1						60
				No.	8			1	6							61
				No.	8			3	11	3						62
				No.	15	25		1								63

¹ For 95 companies only, and includes 6 companies operating part of year.
² For 10 companies only, and includes 1 company operating part of year.

³ For 14 months only.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY	NUMBER OF PASSENGERS CARRIED.				Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.	Total.			Passenger cars.	Freight, mail, express, and other cars.		
NEW YORK—Continued.											
63	Staten Island Midland.....	3,079,623	2,718,972	360,651	2	98,371	899,118	897,118	2,000	3.03	
64	Staten Island Electric.....	4,782,282	4,349,459	432,823	4	140,215	1,123,615	1,122,794	821	3.87	
65	Niagara Gorge Railroad.....	763,991	653,247	110,744	7	42,419	265,118	265,118		2.46	
66	Northport Traction.....	27,052	27,052			9,873	10,209	10,209		2.65	
67	Ogdensburg Street Railway.....	496,783	478,283	18,500	2	47,828	367,635	364,635	3,000	1.31	
68	Olean, Rock City and Bradford.....	963,738	957,738	6,000	1	50,781	220,300	220,300		4.33	
69	Olean Street Railway.....	1,255,103	1,232,035	23,068	1	92,984	326,396	326,396		3.77	
70	Oneida Railway.....	82,495	82,495			54,997	38,802	38,802		2.13	
71	Oneonta, Cooperstown and Richfield Springs.....	553,346	541,219	12,127	2	18,041	267,766	267,766		2.02	
72	Westchester Traction.....	360,000	328,900	31,100	1	123,647	168,150	168,000	150	1.96	
73	Oswego Traction.....	1,000,420	844,176	156,244	2	75,711	365,470	363,340	2,130	2.32	
74	Peekskill Lighting and Railroad.....	815,388	776,794	38,594	3	74,980	203,752	203,752		3.81	
75	Penn Yan, Keuka Park and Branchport.....	213,843	213,843			23,118	74,080	66,195	7,885	3.23	
76	Plattsburg Traction.....	422,192	422,192			64,953	159,651	159,651		2.64	
77	New York and Stamford.....	1,991,401	1,859,401	132,000	3	112,486	580,933	580,933		3.20	
78	Port Jervis Electric, Gas and Railroad.....	241,937	212,964	28,973	1	41,758	85,240	85,240		2.50	
79	Poughkeepsie and Wappingers Falls.....	2,008,647	1,813,420	195,227	5	104,641	500,301	500,301		3.62	
80	Rochester Railway.....	26,719,909	20,171,260	6,548,649	23	192,254	5,249,617	5,196,819	52,798	3.88	
81	Rochester and Suburban.....	490,966	478,966	12,000	1	43,034	144,067	144,067		3.32	
82	Rochester and Sodus Bay.....	1,896,138	1,842,918	53,220	7	38,766	394,271	355,813	38,458	5.18	
83	Rochester, Charlotte and Manitou.....	1,653,420	1,645,420			21,345	66,750	66,750		2.48	
84	Rome City.....	215,610	205,851	9,759	3	33,969	85,742	85,742		2.40	
85	Schenectady Railway.....	4,536,949	4,057,875	479,074	3	94,854	1,129,041	1,106,814	22,227	3.67	
86	Sea Cliff Inclined Cable.....	24,751	24,751			137,506	(4)				
87	Southfield Beach Railroad.....	50,582	50,582			12,646	8,349	8,349		6.06	
88	Syracuse Rapid Transit.....	17,351,247	14,234,508	3,116,739	21	208,840	3,704,195	3,704,195		3.84	
89	Syracuse and Suburban.....	1,433,475	1,433,475			100,173	399,410	382,498	16,912	3.75	
90	Syracuse, Lakeside and Baldwinsville.....	1,940,467	1,940,467			84,258	425,047	425,047		4.57	
91	Utica and Mohawk Valley.....	9,849,445	8,761,302	1,088,143	6	114,978	2,270,235	2,270,235		3.86	
92	Black River Traction.....	1,188,605	1,188,605			113,525	400,000	400,000		2.97	
93	Elmira and Seneca Lake.....	730,400	730,400			44,509	241,434	241,434		3.03	
94	Buffalo, Gardenville and Ebenezzer.....	275,426	275,426			58,978	101,500	100,609	891	2.74	
95	Hamburg Railway.....	584,271	490,123	94,148	2	47,447	292,290	291,000	1,290	1.68	
96	Buffalo and Williamsville.....	252,218	252,218			55,555	96,633	96,633		2.61	
NORTH CAROLINA.											
Total for state.....		6,783,695	5,837,867	1,446,328	8	115,228	1,676,978	1,629,299	47,679	3.28	
1	Asheville Electric.....	911,480	611,480	300,000	1	104,170	123,516	123,516		4.95	
2	Asheville Street Railroad.....	1,274,667	1,274,667		1	157,756	344,392	336,598	7,794	3.79	
3	Asheville and Craggy Mountain.....	39,026	39,026			2,561	42,055	42,055	14,170	2.75	
4	Charlotte Railway, Light and Power.....	1,335,506	1,160,519	174,987	2	102,792	412,880	412,880		2.81	
5	Raleigh Electric.....	1,099,000	599,000	500,000	1	133,111	163,520	163,520		3.66	
6	Consolidated Railways, Light and Power.....	1,244,968	900,000	344,968	1	193,548	243,171	243,171		3.70	
7	Fries Manufacturing and Power.....	879,048	752,675	126,373	2	82,440	347,444	335,444	12,000	2.24	
OHIO.											
Total for state.....		7,356,788,221	285,434,579	71,353,642	189	121,284	783,996,438	83,135,144	861,294	3.43	
1	Ashtabula Rapid Transit.....	999,857	999,857			173,888	305,140	305,140		3.28	
2	Pennsylvania and Ohio.....	758,346	758,346			27,328	287,620	287,620		2.64	
3	Ohio Central Traction.....	255,000	255,000			14,982	166,805	166,805		1.53	
4	Consolidated.....	31,991	31,991			15,996	6,720	6,720		4.76	
5	Stark Electric.....	365,038	355,038	10,000	2	13,164	123,000	123,000		2.89	
6	Canton-Akron.....	4,183,326	4,183,326		2	83,383	907,739	887,739	20,000	4.71	
7	Chillicothe Electric Railroad, Light and Power.....	317,418	317,418			62,117	91,250	91,250		3.48	
8	Cincinnati Traction.....	94,273,255	69,510,122	24,763,133	36	326,400	20,485,369	20,485,369		3.39	
9	Price Hill Incline Plane.....	433,517	433,517			710,684	144,506	144,506		3.00	
10	Mill Creek Valley.....	2,525,680	2,020,544	505,136	3	55,357	1,084,639	1,084,639		1.86	
11	Cincinnati, Dayton and Toledo.....	4,009,164	3,939,432	69,732	2	49,961	2,189,734	2,109,954	79,780	1.87	
12	Cincinnati, Lawrenceburg and Aurora.....	1,100,141	1,100,141			28,029	625,296	625,296		1.76	
13	Cleveland Electric Railway.....	63,013,331	47,234,146	15,779,185	7	329,571	11,274,917	11,274,917		4.19	
14	Cleveland City Railway.....	39,364,394	34,136,056	5,228,338	7	360,923	7,493,598	7,493,598		4.56	
15	Cleveland, Elyria and Western.....	4,122,480	2,296,280	1,826,200	4	30,017	1,186,017	1,127,617	58,400	2.04	
16	Eastern Ohio Traction.....	714,401	714,401			7,073	689,781	689,781		1.04	
17	Cleveland, Painesville and Eastern.....	1,537,754	1,437,754	100,000	3	33,235	779,447	779,447		1.84	
18	Northern Ohio Traction.....	10,506,029	8,689,672	1,816,357	8	78,818	2,902,146	2,803,945	98,201	3.10	
19	Columbus Railway.....	32,753,046	26,489,927	6,263,119	35	248,896	5,637,599	5,619,476	18,123	4.71	
20	Columbus, London and Springfield.....	200,501	200,501			2,762	244,383	232,502	11,881	.86	
21	Columbus, Buckeye Lake and Newark.....	597,570	597,570			13,262	450,000	450,000		1.33	
22	City Railway.....	8,864,006	7,346,171	1,517,835	5	276,692	2,310,823	2,310,823		3.18	
23	Peoples Railway.....	6,474,726	4,781,332	1,693,394	4	210,631	1,649,722	1,649,722		2.90	
24	Oakwood Street.....	3,352,359	2,539,591	812,768	2	321,467	708,981	708,981		3.58	
25	Dayton and Western.....	500,000	500,000			17,699	401,500	365,000	36,500	1.37	
26	Dayton and Northern.....	580,910	580,910			12,935	540,020	490,100	49,920	1.19	
27	Dayton, Springfield and Urbana.....	363,472	363,472		1	6,537	181,736	181,736		2.00	
28	Dayton and Troy.....	730,000	730,000			15,632	761,900	708,100	43,800	1.03	
29	Dayton and Xenia.....	967,888	947,256	20,632	4	17,869	486,279	486,279		1.95	
30	Peoples Gas and Electric.....	75,000	75,000			16,556	30,420	30,420		2.47	
31	Delaware Electric Railway.....	12,433,633	312,627	121,006	1	41,684	167,200	167,200		1.87	
32	United Electric.....	297,798	297,798			146,699	120,140	120,140		2.48	
33	East Liverpool Railway.....	2,625,570	2,625,570			178,489	877,000	848,925	28,075	3.09	
34	Lancaster Traction.....	482,872	472,872	10,000	1	124,113	164,660	164,660		2.87	
35	Lima Railway and Light.....	1,632,221	1,375,979	256,242	1	66,958	486,980	486,980		2.83	
36	Western Ohio Railway.....	571,886	571,886			7,098	511,389	443,192	68,197	1.29	
37	Lorain Street Railway.....	2,152,300	2,152,300			184,430	421,312	421,312		5.11	
38	Mansfield Railway, Light and Power.....	1,870,556	1,168,334	702,222	1	55,635	562,060	559,180	2,880	2.09	
39	Marion Street Railway.....	565,536	557,036	8,500	1	130,149	258,420	258,420		2.16	
40	Mt. Vernon Electric Railway.....	144,280	144,280			28,290	100,000	100,000		1.44	
41	Newark and Granville.....	1,448,364	1,448,364			104,274	273,453	273,453		5.30	
42	Tuscarawas Traction.....	1,028,099	1,028,099			76,552	365,100	365,100		2.82	

1 For 3 months only.

2 For 11 months only.

3 For 6 1/2 months only.

4 Not reported.

5 For 2 1/2 months only.

6 Estimated.

GENERAL TABLES.

367

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.				Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.	Fare passen- gers per car hour.		In city limits.	Outside city limits.		Total. Killed. Injured.	Passengers. Killed. Injured.	Employees. Killed. Injured.	Others. Killed. Injured.					
				Yes	10				1	10	1	2				8
				No	10					10		4				6
				No	8	30				5		3				
				Yes	10	15							2			
				No	8											
16,425	16,425		58.31	Yes	10	22	1			13		8		4		1
				No	10	25				2		1		1		
				No	5											
				Yes	10	18			1	13		4	1	9		
				Yes	6	6										
65,700	65,700		12.85	No	8	10				3		1				2
				Yes	8	16										
				Yes	12	20	1	2	1		1				1	
				No	8	14										
				No	12	15										
				No	8											
				Yes	11	15			1		1					
703,326	692,376	10,950	29.13	Yes	15	20			2	17		6		5	2	6
				No	12	15	1									
				Yes	15	30				2		1				1
				No	10	15										
				No	15					3						8
				No	12	30	1	6					1		5	
				No	7											
				No	10											
				Yes	15	12	2	1	28			15	1			13
33,555	31,755	1,800	45.14	Yes	8		1		5			1				4
				No	8	28										
599,816	599,816		14.61	Yes	8	15	2	4	16			14	1	1	3	1
				No	10	20		1							1	
				No	9	15			1					1		
				No	15											
				Yes	20	50		1	4			3		1	1	
				Yes	20	20										
51,610	51,610		22.49				4	2	15			7	1	6	1	2
				No	9	10	1									
				No	9	10			8			7				1
				No	9	10	1		6					6		3
51,610	51,610		22.49	No	12	15	1	1	1						1	4
				No	6	12										5
				No	4											6
				No	8	10	1	1					1			7
4,642,564	4,595,702	46,862	31.58				25	116	4,069	19	1,808	9	326	88	1,935	
				No	9				1							1
24,090	24,090		41.50	No	8	20										2
				No	8	25	1		1							3
				Yes	8											4
				No	8	30		1								5
9138,355	134,443	3,912	31.12	Yes	8	30	1		2							6
				No	12			1								7
2,229,066	2,229,066		31.18	Yes	(*)	(*)		15	197	1	102		31	15	64	8
				No	6											9
				Yes	8	15										10
				No	10	50	1	2	31		13	1	1	1	17	11
				Yes	12	40		2	6		2			2	4	12
				No	12			12	579		369		52	12	158	13
821,250	821,250		41.57	Yes	15			15	841		200		27	15	614	14
91,600	86,400	5,200	26.58	Yes	12	40	1	2	60		27		8	2	25	15
				Yes	12	15			3				1		2	16
				Yes	15	40	1	1	11		4			1	7	17
				Yes	12	40	1	5	216	3	199	2	17			18
				No	8	20	1	10	869					10	869	19
				Yes	12	35	1		3		3					20
				No	8	30	1		1							21
241,814	241,814		30.38	No	10	25		2	24		8		3	2	13	22
159,332	159,332		80.01	Yes	10		1	3	22		11		1	3	10	23
				No	10	15										24
				No	6	20										25
23,360	20,075	3,285	24.91	Yes	10	50		2								26
30,024	26,240	3,784	22.10	Yes	10											27
				Yes	10	35	1		17		17					28
46,800	43,640	3,120	16.71	Yes	12	25	1		5						5	29
28,740	28,740		32.96	Yes	10	25	1		2		2					30
				No	6				1							31
				No	12											32
19,710	19,710		15.11	Yes	8											33
92,480	89,360	3,120	29.38	No	5	5		2	18		18			2		34
35,040	35,040		13.50	No	10											35
				No	8		1									36
				Yes	12	25	1	3	63		23	1	28	2	12	37
27,102	27,102		79.41	Yes	12	55			20		8		7		5	38
				No	8	18	1		2		1		1			39
				No	15			1	7		3			1		40
				No	12	12	1									41
				Yes	6	15										42
26,985	26,985		38.10	Yes	6	20	1		2				1			43

* Includes 6 companies operating part of year.

* For 26 companies only, and includes 3 companies operating part of year.

* For 7 months only.

10 Includes passengers and employees.

11 For 9 months only.

12 For 10 months only.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and others.	
OHIO—Continued.										
43	Ohio River Railway and Power	751,857	751,857			57,746	270,417	270,417		2.78
44	Portsmouth Street Railroad	901,783	901,783			163,960	325,612	325,612		2.77
45	Salem Electric Railway	176,951	176,951		1	66,774	65,233	65,233		2.71
46	Springfield Railway	4,702,323	3,784,338	917,985	1	134,530	1,086,087	1,086,087		3.48
47	Springfield and Xenia	102,448	102,448			5,484	57,650	57,650		1.78
48	Steubenville and Pleasant Heights	117,636	117,636			38,194	23,373	23,373		5.03
49	Steubenville Traction and Light	1,380,200	1,380,200			107,997	387,191	387,191		3.57
50	Electric Railway and Power	482,000	482,000			65,757	91,980	91,980		5.24
51	Tiffin, Fostoria and Eastern	327,740	327,740			19,279	307,935	287,765	20,170	1.14
52	Toledo Railways and Light	24,941,744	20,104,076	4,837,668	38	205,605	5,517,484	5,517,484		3.64
53	Toledo, Bowling Green and Southern	1,896,155	1,896,155			36,207	549,325	549,325		3.45
54	Toledo, Fostoria and Findlay	420,787	420,787			24,351	278,026	278,026		1.51
55	Toledo and Western	330,695	330,695			4,685	401,203	302,203	99,000	1.09
56	Lake Shore	3,886,902	3,686,862	200,040	11	20,102	2,444,894	2,315,006	129,828	1.59
57	Toledo and Maumee Valley	731,539	731,539			26,126	462,999	396,857	66,142	1.84
58	Wellston and Jackson Belt	928,925	928,925			88,469	207,112	207,112		4.49
59	Worthington, Clintonville and Columbus	356,657	356,657			69,660	118,886	118,886		3.00
60	Youngstown Park and Falls	1,241,016	1,241,016			202,450	240,000	240,000		5.17
61	Youngstown-Sharon Railway and Light	3,337,148	3,192,998	144,150	1	75,574	892,230	885,833	6,397	3.60
62	Mahoning Valley	10,000,000	7,000,000	3,000,000	9	180,768	1,424,000	1,400,000	24,000	5.00
63	Zanesville Electric Railway	2,550,000	1,800,000	750,000	8	180,000	400,000	400,000		4.50
OREGON.										
Total for state		23,666,753	18,729,442	4,937,311	20	137,041	4,781,105	4,719,355	61,750	3.97
1	Astoria Electric	300,000	300,000			73,171	140,416	140,416		2.14
2	Portland Railway	6,928,887	5,731,044	1,197,843	5	189,833	1,452,087	1,415,587	36,500	4.05
3	City and Suburban	14,131,389	10,736,389	3,395,000	10	163,914	2,523,816	2,523,816		4.25
4	Portland City and Oregon	1,828,514	1,510,704	317,810	3	58,126	391,496	369,896	21,600	4.08
5	Salem Light, Power and Traction	470,963	444,305	26,658	2	37,180	265,990	265,990		1.67
6	Union Street and Suburban	7,000	7,000			2,545	7,300	3,650	3,650	1.92
PENNSYLVANIA.										
Total for state		6,678,785,699	642,513,812	36,271,787	271	258,983	133,501,699	132,935,671	566,028	4.83
1	Lehigh Valley Traction	16,514,538	14,114,538	2,400,000	6	94,849	3,776,796	3,776,796		3.74
2	Philadelphia and Lehigh Valley	1,527,449	1,512,449	15,000	1	30,219	565,747	565,747		2.67
3	Allentown and Kutztown Traction	1,058,039	1,058,039			48,093	295,688	292,360	3,328	3.62
4	Altoona and Logan Valley	5,521,699	4,759,279	762,420	3	173,065	1,184,195	1,184,195		4.02
5	Bangor and East Bangor	69,441	69,441			25,251	25,052	25,052		2.77
6	Beaver Valley Traction	3,434,315	3,037,060	397,255	1	134,980	768,927	768,927		3.95
7	Riverview Electric Street Railway	137,416	137,416			37,856	102,200	102,200		1.34
8	Patterson Heights Street Railway	28,154	28,154			62,564	2,008	2,008		14.02
9	Columbia and Montour	603,285	603,285			37,125	199,281	199,281		3.63
10	Bradford Electric Street Railway	1,036,342	936,342	100,000	1	81,634	238,819	238,819		3.92
11	Butler Passenger Railway	481,201	390,951	90,250	2	53,924	62,050	62,050		6.30
12	Carlisle and Mt. Holly	191,536	191,536			28,167	119,758	110,994	8,764	1.73
13	Cumberland Valley Traction	616,726	586,726	30,000	1	29,336	303,160	292,000	11,160	2.01
14	Chester Traction	7,222,412	6,572,412	650,000	(10)	204,940	1,300,000	1,300,000		5.06
15	Media, Middletown, Aston and Chester	1,171,074	1,171,074			61,798	577,265	577,265		2.03
16	Philadelphia and Chester Railway	331,421	331,421			38,007	202,192	202,192		1.64
17	Connellsville Suburban	400,000	400,000			160,000	102,000	102,000		3.92
18	Newtown Electric Street Railway	876,828	876,828			31,439	390,379	390,379		2.25
19	Doylestown and Easton	116,354	16,354			2,726	4,708	4,708		3.47
20	Doylestown and Willow Grove	1,040,866	1,023,707	17,159	1	76,510	274,116	274,116		3.73
21	Dubois Traction	356,249	356,249			265,857	34,008	34,008		10.48
22	Easton and Nazareth	557,440	557,440			55,744	248,930	248,930		2.24
23	Erie Electric Motor	6,888,234	4,616,125	2,272,109	6	164,862	1,259,540	1,259,540		3.66
24	Erie Traction	232,477	232,477			8,303	212,843	212,843		1.09
25	Erie Rapid Transit	394,769	383,979	10,790	1	23,999	122,885	122,885		3.12
26	Franklin Electric Street Railway	815,274	701,134	114,140	1	187,459	188,130	188,130		3.73
27	Gettysburg Transit	89,675	89,675			9,439	50,580	50,580		1.77
28	Hanover and McSherrystown	147,151	147,151			39,451	37,530	37,530		3.92
29	Lehigh Traction	2,643,711	2,632,761	10,950	1	131,048	540,626	530,632	9,994	4.96
30	Harrisburg Traction	10,589,161	8,727,334	1,861,827	10	178,109	1,865,097	1,859,463	5,634	4.69
31	Harrisburg and Mechanicsburg	1,048,668	985,414	63,254	3	64,196	167,524	161,728	5,796	6.09
32	Cambria Incline Plane	411,139	411,139			1,209,232	14,609	14,609		28.14
33	Johnstown Passenger Railway	6,017,942	5,470,856	547,086	3	174,788	1,168,091	1,168,091		4.68
34	Kittanning and Ford City	747,196	747,196			142,323	373,596	373,596		2.00
35	Conestoga Traction	5,515,401	4,967,901	547,500	5	59,276	1,504,140	1,504,140		3.30
36	Lebanon Valley	1,600,998	1,519,295	81,703	2	66,056	359,467	359,467		4.23
37	Lewistown and Reedsville	930,549	930,549			148,888	176,492	176,492		5.27
38	Susquehanna Traction	438,944	438,944			82,046	189,800	189,800		2.31
39	Lykens and Williams Valley	426,233	426,233			39,686	197,100	197,100		2.16
40	Highland Grove	197,629	197,629			65,440	30,000	30,000		6.69
41	Schuylkill Traction	2,582,286	2,582,286			92,224	793,440	793,440		3.25
42	Mauch Chunk, Lehigh and Slatington	554,239	474,479	79,760	2	35,973	227,028	227,028		2.09
43	Meadville Traction	806,025	806,025			73,275	191,625	191,625		4.21
44	Lewisburg, Milton and Watonsville	487,270	487,270			49,319	142,665	142,665		3.42
45	Montoursville Passenger	337,822	337,822			67,564	124,513	124,513		2.71
46	New Castle Traction	3,403,734	2,774,201	629,533	1	144,490	730,456	730,456		3.80
47	New Castle and Lowell	398,892	398,892			31,937	138,242	67,129	1,113	5.94
48	Schuylkill Valley Traction	5,719,797	5,138,821	580,976	6	100,152	1,595,610	1,595,610		3.22
49	Lansdale and Norristown	146,670	161,726	3,944	1	12,178	149,087	149,087		3.29
50	Peoples Street Railway	585,988	585,988			97,656	129,131	129,131		4.54
51	Citizens Traction	1,285,101	1,175,464	109,637	2	87,590	211,562	211,562		5.56
52	Oil City Street Railway	777,990	672,528	105,462	2	83,028	197,326	197,326		3.41
53	Union Traction	325,801,963	325,801,963	(10)	67	685,235	59,721,423	59,375,543	345,880	5.49
54	Southwestern Street Railway	776,191	776,191			48,573	309,944	309,944		2.50
55	Philadelphia, Bristol and Trenton	330,069	330,069			27,948	169,158	169,158		1.95

1 For 5 months only.

2 For 8 months only.

3 Includes "others."

4 Estimated.

5 For 4 companies only.

6 Includes 6 companies operating part of year.

7 For 51 companies only, and includes 4 companies operating part of year

8 For 84 months only.

GENERAL TABLES.

369

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.				Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.	In city limits.			Outside city limits.	Total.		Passengers.		Employees.		Others.				
							Killed.		Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.		
				Yes	8	15										43	
				No	4	6	1	1	4		2			1	2	44	
16,520	16,520		10.71	No	8											45	
148,689	148,689		25.45	No	12			1	28	1	18				10	46	
14,868	4,868		21.04	No	12	40										47	
14,080	4,080		28.83	No	8				2		2					48	
119,094	119,094		11.59	No	10	25	1		35		19		4		12	49	
				No	12		1		1				1			50	
18,250	14,600	3,650	22.45	No	12	25										51	
				Yes	8	20		12	656	*12	*564		92			52	
14,139	14,139		29.76	Yes	10	30		2	2		2	1		1		53	
				Yes	10	25	1		7		5		2			54	
				Yes	4	23					1					55	
177,540	162,969	14,571	22.62	Yes	16	40	1	6	46		24	2	10	4	12	56	
43,636	37,376	6,260	19.57	Yes	8	30										57	
				Yes	6	15	1									58	
				No	15	10		1	4					1		59	
				No	15	20	1	2	2		2			2	4	60	
				No	15	55		8	88		50	1	12	1	26	61	
				Yes	15	25		8	182	1	107	1	27	6	48	62	
60,000	60,000		30.00	Yes	8				2		2					63	
* 480,979	477,379	3,600	27.21				1	9	68	3	33	1	3	5	27		
				No	15											1	
22,112	22,112		13.57	Yes	12			4	33	1	21		2	3	10	2	
338,392	338,392		31.73	Yes	12	20	1	3	26	2	12			1	14	3	
77,040	73,440	3,600	20.57	Yes	8	20		2	3			1	1	1	2	4	
43,435	43,435		10.23	No	10	10										5	
				Yes	10	15										6	
* 3,679,314	3,674,665	4,649	32.16				46	186	2,680	37	1,548	9	233	140	899		
453,000	453,000		31.16	Yes	8	20	2	4	201	2	119		46	2	36	1	
52,560	52,560		28.78	Yes	8	30		9	46	5	28	2	10	2	8	2	
36,442	36,130	312	29.28	Yes	10	20	2									3	
142,916	142,916		33.30	No	12	20	1		30		8		4		18	4	
* 4,555	4,555		15.25	No	8	15										5	
				Yes	10	15	2									6	
				No	8											7	
				Yes	8											8	
				No	8	20										9	
30,660	30,660		30.54	No	10	15	1		2		1				1	10	
31,025	31,025		12.60	No	10	20	1		2						2	11	
				Yes	10	25	1									12	
33,790	32,850	930	17.86	Yes	8	15	1									13	
190,000	190,000		34.59	Yes	8	12		8	77		48			2	8	14	
				No	7	7			1							15	
22,363	22,363		14.82	No	8	12			6		4					16	
				No	8	15			2		1					17	
71,210	71,210		12.31	Yes	8	14										18	
11,750	750		21.81	No	6	25										19	
				Yes		15										20	
				No	6		1		3				1		2	21	
26,072	26,072		21.88	No	10	20	1	2	60	2	60					22	
156,471	156,471		29.50	No	10	20		2	1		1			2		23	
14,932	14,932		15.57	Yes	6	40										24	
10,120	10,120		37.94	No	8	15		3	4		3			3	1	25	
				No	6											26	
5,040	5,040		17.79	No	8	12										27	
6,255	6,255		23.53	No	8	12										28	
61,995	59,595	2,400	44.18	Yes	8	15	1									29	
254,626	254,000	626	34.36	Yes	8	25	1	4	35		19		6	4	10	30	
23,807	23,426	381	42.06	Yes	8	25										31	
				No	3											32	
				No	12	20			20		15					33	
				No	8	12			2							34	
150,000	150,000		33.12	Yes	7	12	2	8	19		5			3	14	35	
32,359	32,359		46.96	No	7	15			11		5				6	36	
24,284	24,284		38.32	No	6	18	1		2						2	37	
17,885	17,885		24.54	Yes	7	15	1		1		1					38	
19,710	19,710		21.63	No	8	12	1									39	
				No	8											40	
72,000	72,000		35.87	No	6	12	1	1	23		16			1	7	41	
29,565	29,565		16.06	No	6	10	1									42	
				No	8											43	
				No	12	20	1									44	
				No	6	6	1		1		1					45	
95,000	95,000		29.20	No	8	10	1	1	29	1	26		3			46	
				No	6	25			20		12		8			47	
185,424	185,424		27.71	Yes	8	14		6	75	1	41		6	5	2	48	
14,116	4,116		39.29	No	12	12										49	
				Yes	12	12			2		2					50	
				No	6	15										51	
				No	6	15										52	
				Yes	7	10	1	42	300	9	239	2		31	61	53	
36,296	36,296		21.39	No	8			1	39	1	25		2		12	54	
				No	3	3										55	

* For 10 months only.
 † Not reported.
 ‡ For 1 month only.

§ For 10 months only.
 || For 4 months only.
 ¶ For 3 months only.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.				Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.				Total.	Passenger cars.	Freight, mail, express, and other cars.	
PENNSYLVANIA—Continued.											
56	Philadelphia and West Chester Traction.....	653,575	653,575				27,142	1200,000	200,000		3.27
57	Holmesburg, Tacony and Frankford.....	2,415,056	2,398,066	16,990	1	131,114	713,853	713,853	713,853		3.36
58	Fairmount Park Transportation.....	2,328,465	2,328,465				264,598	1776,155	776,155		3.00
59	Delaware County and Philadelphia.....	1,568,082	1,568,082				156,808	437,719	437,719		3.58
60	Montgomery and Chester.....	310,827	310,827				55,804	125,120	125,120		2.42
61	Pittsburg Railways.....	179,912,227	161,436,822	18,475,405	70	393,739	33,067,964	32,905,140	162,824		4.99
62	St. Clair Incline Plane.....	492,670	462,946	29,724	1	578,682	29,200	29,200			15.85
63	Duquesne Incline Plane.....	1,095,984	482,240	613,744	1	1,607,467	14,000	14,000			34.45
64	Pittsburg and Castle Shannon.....	802,204	578,374	223,830	1	1,112,258	31,937	31,937			18.11
65	Monongahela Incline Plane.....	1,178,488	691,505	486,983	1	1,440,685	11,400	10,000	1,400		69.15
66	Penn Incline Plane.....	550,000	275,000	275,000	1	808,824	19,856	19,856			13.85
67	Pittsburg, McKeesport and Greensburg.....	1,517,555	1,517,555				71,047	475,000	475,000		3.19
68	Pittsburg, McKeesport and Connellsville.....	4,587,581	4,507,823	79,758	1	80,497	1,270,978	1,270,978			3.55
69	Pottstown Passenger Railway.....	746,821	716,098	30,723	2	117,201	202,668	202,668			3.53
70	Ringling Rocks Electric.....	202,836	202,836				53,378	71,540	71,540		2.84
71	Pottsville Union Traction.....	3,657,750	3,373,400	284,350	3	78,818	1,047,592	1,047,592			3.22
72	Punxsutawney Street Railway.....	988,555	988,555				81,497	1,325,000	1,325,000		3.04
73	United Traction.....	9,869,900	9,171,891	698,009	22	144,576	2,231,733	2,231,733			4.11
74	Waverly, Sayre and Athens.....	1,139,217	1,059,507	79,710	1	116,302	281,549	281,549			3.76
75	Neversink Mountain Railroad.....	72,748	72,748				8,362	38,849	38,849		1.87
76	Mt. Penn Gravity Railway.....	65,000	65,000				8,125	20,288	20,288		3.20
77	Scranton Railway.....	9,806,343	8,331,663	1,474,680	20	108,655	2,322,162	2,322,162			3.59
78	Shamokin and Mt. Carmel.....	1,964,461	1,964,461				96,534	319,800	319,800		6.14
79	Shamokin and Edgewood.....	550,515	550,515				172,036	147,143	147,143		3.74
80	Stroudsburg Passenger.....	121,161	121,161				44,059	25,040	25,040		4.84
81	Sunbury and Northumberland.....	314,954	314,954				80,757	124,100	124,100		2.54
82	Tamaqua and Lansford.....	1,049,427	1,029,903	19,524	1	70,397	266,048	266,048			3.87
83	Tarentum Traction Passenger.....	622,447	622,447				94,167	173,842	173,842		3.58
84	Titusville Electric Traction.....	520,000	520,000				43,333	149,000		9,000	3.71
85	Warren Street Railway.....	1,451,974	1,342,974	109,000	3	67,149	474,500	474,500			2.83
86	Washington Electric Railway.....	1,003,828	1,003,828				307,923	104,390	104,390		9.62
87	West Chester Street Railway.....	244,906	235,783	9,125	1	40,236	107,310	107,310			2.20
88	Wilkesbarre and Wyoming Valley.....	13,693,909	13,098,909	595,000	(2)	196,739	2,512,143	2,512,143			5.21
89	Wilkesbarre, Dallas and Harveys Lake.....	917,024	917,024				55,577	165,000	165,000		5.56
90	Vallamont Traction.....	507,044	297,032	210,012	2	80,279	91,755	91,755			3.24
91	South Side Passenger Railway.....	416,299	243,557	172,742	1	119,979	94,577	94,577			2.58
92	Williamsport Passenger Railway.....	2,339,074	1,912,005	427,069	5	221,297	419,247	419,247			4.56
93	East End Passenger Railway.....	159,357	129,703	29,654	1	52,940	62,568	62,568			2.07
94	Red Lion and Windsor.....	18,912	8,912				4,456	3,960	3,960		2.25
95	Yardley, Morrisville and Trenton.....	131,858	131,858				22,013	73,273	73,273		1.80
96	York and Dover Electric.....	74,866	74,866				8,263	42,997	42,997		1.74
97	York and Dallastown Electric.....	169,938	169,938				22,903	70,365	70,365		2.42
98	York Street Railway.....	2,220,836	1,770,836	450,000	2	144,558	463,639	462,404	1,235		3.83
RHODE ISLAND.											
Total for state.....		*62,394,165	62,279,165	115,000	3	189,356	*12,296,893	12,173,911	122,982		5.12
1	Sea View Railroad.....	700,378	700,378				37,096	150,840	150,840		4.64
2	Pawtucket Street Railway.....	3,665,635	3,665,635				185,978	843,199	843,199		4.35
3	Union Railroad.....	45,163,704	45,163,704				320,128	8,051,037	8,016,662	34,375	5.63
4	Rhode Island Suburban.....	5,129,222	5,129,222				75,352	1,368,256	1,324,649	43,607	3.87
5	Providence and Danielson.....	651,276	651,276				22,836	295,000	250,000	45,000	2.61
6	New York, New Haven and Hartford.....	4,520,894	4,520,894				143,520	1,123,270	1,123,270		4.02
7	Pawcatuck Valley Railway.....	*360,043	360,043				57,792	*90,011	90,011		4.00
8	Woonsocket Street Railway.....	2,203,013	2,088,013	115,000	3	93,465	375,280	375,280			5.56
SOUTH CAROLINA.											
Total for state.....		10,748,724	9,056,818	1,691,906	27	117,652	2,520,231	2,502,844	17,387		3.62
1	North Augusta Electric and Improvement.....	115,054	115,054				34,040	19,800	19,800		5.81
2	Charleston Railway, Gas and Electric.....	6,966,656	5,962,395	1,003,260	20	172,934	1,577,320	1,577,320			3.77
3	Columbia Railway, Light and Power.....	2,106,042	1,638,357	469,685	2	117,025	494,366	494,366			3.31
4	Greenville Traction.....	700,564	587,603	112,961	2	76,800	152,518	152,518			3.52
5	Orangeburg City Street Railway.....	23,800	23,800				12,727	19,055	6,570	12,485	3.62
6	Rock Hill Water, Light and Railway.....	12,000	12,000				9,160	8,668	8,668		1.38
7	Spartanburg Railway, Gas and Electric.....	803,609	777,609	26,000	3	48,601	248,504	243,602	4,902		3.19
SOUTH DAKOTA.											
Total for state.....											
1	Rapid City Street Railway*.....										
TENNESSEE.											
Total for state.....		45,476,511	35,697,835	9,778,676	40	140,432	10,138,603	10,134,919	3,684		3.52
1	Bristol Belt Line.....	160,674	160,674				37,806	86,400	86,400		1.86
2	Chattanooga Electric Railway.....	4,058,824	3,329,000	729,824	1	86,738	1,273,000	1,273,000			2.62
3	Rapid Transit of Chattanooga.....	2,131,134	2,040,678	90,456	6	53,005	1,680,226	680,226			3.00
4	Electric Railway of Clarksville.....	300,000	300,000				54,545	111,690	111,690		2.69
5	Jackson and Suburban.....	322,865	302,686	20,179	2	94,886	245,280	245,280			1.23
6	Knoxville Traction.....	2,804,059	2,453,780	350,279			94,376	1,015,341	1,015,341		2.42
7	Memphis Street Railway.....	19,254,313	16,598,823	2,655,490	18	230,924	3,653,631	3,653,631			4.54
8	Nashville Railway.....	16,444,642	10,512,194	5,932,448	13	158,078	3,073,035	3,069,351	3,684		3.42
TEXAS.											
Total for state.....		*32,165,682	30,037,966	2,127,716	12	99,047	*9,804,017	9,750,779	53,238		3.08
1	Austin Electric Railway.....	1,213,703	1,213,703				90,710	560,000	560,000		2.17
2	Bonham Electric Railway, Light and Power.....	147,785	147,785				56,192	34,300	34,300		4.31
3	Dallas Consolidated.....	6,165,738	5,618,238	547,500	1	162,189	1,693,112	1,693,112			3.32

1 Estimated.
2 Not reported.

* Includes 1 company operating part of year.
* For 6 months only.

GENERAL TABLES.

371

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.				Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.	Fare passen- gers per car hour.		In city limits.	Outside city limits.		Total. Killed. Injured.	Passengers. Killed. Injured.	Employees. Killed. Injured.	Others. Killed. Injured.					
70,065	70,065		34.23	Yes		13	1		15		8					56
52,640	52,640		44.23	No.	10			1	30	1	10		7		17	57
42,894	42,894		36.56	No.	8								3			58
				No.	12	18			11		1		2		8	59
				No.	8	15										60
				Yes	15	30	2	79	1,054	14	496	4	104	61	454	61
				No.	4											62
				No.	4											63
				No.	14											64
				No.	22											65
				No.	3											66
				No.	10	27	1	2	2					2	12	67
25,556	25,556		28.02	Yes	10	15	1	7	103	1	56	1	12	5	35	68
				Yes	6	10	1	1	16		16			1		69
				No.	5	7	1									70
118,082	118,082		28.57	Yes	8	15	1		9		5				4	71
				Yes	8	12	1									72
239,440	239,440		38.31	No.	7	10	1	1	3	68	38		3	1	3	73
				Yes	15			3	1		1					74
5,884	5,884		12.36	No.	7	10										75
8,640	8,640		7.52	No.		12	1									76
334,020	334,020		24.94	Yes	8	14			122		73		9		40	77
41,610	41,610		47.21	No.	6	15	1									78
18,767	18,767		29.33	No.	8	10	1									79
5,758	5,758		21.04	Yes	10											80
12,045	12,045		26.15	No.	8	12										81
39,420	39,420		26.13	Yes	6	15	1									82
				No.	15											83
				Yes	10	15										84
45,625	45,625		29.44	No.	6	15	1		3		2		1			85
				No.	6											86
				Yes	8	15	1									87
303,220	303,220		43.20	No.	8	15	1	5	193		131		4	5	58	88
13,140	13,140		69.79	No.	8	14	1	1	34		28			1	6	89
				No.	8	8	1									90
				No.	8	8										91
				No.	8	8										92
				No.	8	8										93
720	720		12.38	No.	8	25										94
6,570	6,570		20.07	No.	8	15			5						5	95
				Yes	7	12										96
				Yes	7	12										97
				No.	7	12	1									98
36,500	29,200	7,300	22.30					17	190		135	2	11	15	44	
				No.		25		1				1				1
				No.	12			1	11		3		2	1	6	2
				Yes	12	25		11	145		111	1	1	10	33	3
				Yes	12	25		2	17		9		5	2	3	4
36,500	29,200	7,300	22.30	Yes	12	12		1	4		3		1	1		5
				Yes	8	8										6
				Yes	8	20		1	13		9		2	1	2	7
49,418	49,418		26.61				4	4	100	1	36		24	3	40	
				No.	10	10	1		2		2					1
				Yes	8	15		1	80		29		22	1	29	2
				No.	15	20	2	1	17	1	5		2		10	3
23,156	23,156		23.22	No.	15	15										4
				No.												5
26,282	26,282		29.61	No.	6											6
				Yes	15	15	1	2	1					2	1	7
783,405	779,755	3,650	21.28				8	21	550	3	247	6	86	12	217	
				No.	6	12										1
164,980	164,250	730	20.27	Yes	8	15	1	3	30	1	15	1	3	1	12	2
				No.	10	25		4	36		30	3	3	1	3	3
18,615	18,615		16.12	No.	8	15	2									4
				No.	8		2		1				1			5
136,990	136,990		17.91	No.	8	12	2	2	35		5	1	14	1	16	6
				Yes	15	20		6	96	2	40		5	4	51	7
462,820	459,900	2,920	22.86	Yes	9	14	1	6	352		157	1	60	5	135	8
1,147,571	1,139,283	8,278	22.41				7	7	424	2	277	1	48	4	99	
67,000	67,000		18.11	No.	10		1	1	3				2	1	1	1
6,570	6,570		22.49	No.	10	15										2
230,038	230,038		24.42	No.	20	20		1	60		25		6	1	29	3

¹ For 2 companies only.
² This company failed to make a report.

³ For 4 companies only.
⁴ For 13 companies only, and includes 1 company operating part of year.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY.	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
TEXAS—Continued.										
4	Rapid Transit.....	956,535	956,535	.....	.....	73,580	516,110	516,110	.....	1.85
5	Denison and Sherman.....	1,060,000	1,060,000	.....	.....	65,432	338,860	338,860	.....	3.13
6	El Paso Electric Railway.....	2,154,035	1,945,196	208,839	1	144,302	310,521	310,521	.....	6.26
7	Northern Texas Traction.....	2,450,558	2,450,558	.....	.....	39,717	996,597	996,597	.....	2.46
8	Galveston Street Railway.....	2,851,603	2,851,603	.....	.....	79,520	1,070,202	1,070,202	.....	2.66
9	Houston Electric.....	6,314,529	6,314,529	.....	.....	169,745	1,463,620	1,463,620	.....	4.32
10	Laredo Electric and Railway.....	72,500	72,500	.....	.....	25,439	37,974	37,974	.....	1.91
11	Longview and Junction.....	35,400	35,400	.....	.....	56,190	13,687	13,687	.....	2.59
12	Paris Transit.....	1,400,000	350,000	50,000	1	70,000	112,320	112,320	.....	3.12
13	San Antonio Traction.....	6,407,504	5,268,627	1,138,877	8	115,769	1,895,102	1,841,864	53,238	2.86
14	Seguin Street Railway.....	14,000	14,000	.....	.....	9,333	4,667	4,667	.....	3.00
15	Citizens Railway.....	1,788,025	1,605,525	182,500	1	98,559	690,215	690,215	.....	2.33
16	Waxahachie Street Railway.....	70,244	70,244	.....	.....	14,819	33,365	33,365	.....	2.11
17	Lake Park Street Railroad.....	63,523	63,523	.....	.....	13,401	33,365	33,365	.....	1.90
UTAH.										
Total for state.....		13,799,819	11,493,501	2,306,318	7	129,082	3,047,222	3,047,122	100	3.77
1	Ogden Rapid Transit.....	1,056,910	861,910	195,000	2	78,355	292,100	292,000	100	2.95
2	Consolidated Railway and Power.....	12,667,909	10,556,591	2,111,318	5	140,755	2,741,082	2,741,082	.....	3.85
3	Salt Lake and Utah Valley.....	75,000	75,000	.....	.....	24,671	14,040	14,040	.....	5.34
VERMONT.										
Total for state.....		4,561,523	4,274,806	286,717	6	53,070	1,412,528	1,288,965	123,563	3.32
1	Barre and Montpelier.....	756,471	710,334	46,137	1	80,537	234,904	234,904	.....	3.02
2	Bellows Falls and Saxtons River.....	141,196	141,196	.....	.....	21,590	96,990	87,600	9,390	1.61
3	Brattleboro Street Railway.....	364,987	364,987	.....	.....	72,997	100,683	97,344	3,339	3.75
4	Burlington Traction.....	1,414,535	1,270,136	144,399	3	113,203	292,000	292,000	.....	4.35
5	Rutland Street Railway.....	1,059,408	976,908	82,500	1	93,484	202,886	202,886	.....	4.82
6	St. Albans Street Railway.....	307,783	294,102	13,681	1	21,785	197,139	183,960	13,179	1.60
7	Springfield Electric Railway.....	95,320	95,320	.....	.....	10,463	150,590	62,794	87,796	1.52
8	Mt. Mansfield Electric Railway.....	107,680	107,680	.....	.....	9,572	44,908	35,049	9,859	3.07
9	Military Post Railway.....	314,143	314,143	.....	.....	67,413	92,428	92,428	.....	3.40
VIRGINIA.										
Total for state.....		*52,369,902	44,275,661	8,094,241	113	127,562	*12,335,072	12,304,104	30,968	3.60
1	Charlottesville City and Suburban.....	480,112	457,792	22,320	1	123,728	119,330	119,330	.....	3.84
2	Danville Railway and Electric.....	1,137,358	1,073,035	64,323	2	202,459	275,033	275,033	.....	3.90
3	Washington, Arlington and Falls Church.....	865,980	865,980	.....	.....	72,649	228,190	219,000	9,190	3.95
4	Lynchburg Traction and Light.....	2,004,589	1,822,349	182,240	5	117,571	563,859	563,859	.....	3.23
5	Citizens Railway, Light and Power.....	1,006,989	986,989	20,000	9	103,567	202,737	202,737	.....	4.87
6	Newport News and Old Point Railway and Electric.....	4,904,412	4,154,412	750,000	9	104,199	729,885	715,845	14,040	5.80
7	Bay Shore Terminal.....	*36,779	36,779	.....	.....	3,065	*28,080	28,080	.....	1.31
8	Norfolk and Atlantic Terminal.....	1,102,376	1,102,376	.....	.....	57,898	372,975	372,975	.....	2.96
9	Berkley Street Railway.....	586,791	586,791	.....	.....	41,121	*140,226	140,226	.....	4.18
10	Norfolk Railway and Light.....	7,823,052	7,227,508	595,544	30	136,291	1,894,945	1,894,945	.....	3.81
11	Southside Railway and Development.....	1,399,118	1,248,059	151,059	6	97,125	541,503	541,503	.....	2.30
12	Richmond and Petersburg Electric.....	*109,934	109,934	.....	.....	4,763	*91,098	91,098	.....	1.21
13	Old Dominion Railway.....	(⁹)	.....	.....	.....	.....	(⁹)	.....	.....	.....
14	Norfolk, Portsmouth and Newport News.....	1,293,510	1,102,410	191,100	3	127,742	492,750	492,750	.....	2.24
15	Radford Water Power.....	126,914	126,914	.....	.....	42,589	64,240	64,240	.....	1.98
16	Richmond Traction.....	8,053,441	6,795,946	1,257,495	16	286,628	2,248,624	2,248,624	.....	3.02
17	Richmond Passenger and Power.....	12,411,005	9,517,614	2,893,391	21	348,248	1,873,533	1,873,533	.....	5.08
18	Virginia Passenger and Power.....	6,066,982	4,184,313	1,882,669	10	111,285	1,349,461	1,349,461	.....	3.10
19	Roanoke Railway and Electric.....	1,256,292	1,172,192	84,100	1	61,565	451,111	451,111	.....	2.60
20	Tazewell Street Railway.....	18,500	18,500	.....	.....	9,250	5,840	5,840	.....	3.17
21	Washington, Alexandria and Mt. Vernon.....	1,685,768	1,685,768	.....	.....	65,239	661,652	653,914	7,738	2.58
WASHINGTON.										
Total for state.....		42,533,743	41,544,228	989,515	57	181,471	8,378,420	8,285,417	93,003	5.01
1	Everett Railway and Electric.....	1,246,940	971,650	275,290	2	100,689	193,836	193,836	.....	5.01
2	Olympia Light and Power.....	200,870	200,870	.....	.....	48,055	106,752	92,980	13,772	2.16
3	Seattle Electric.....	26,525,701	26,525,701	(⁹)	33	318,857	4,615,402	4,588,281	27,121	5.78
4	Seattle and Renton.....	593,873	593,873	.....	.....	44,820	258,055	238,710	19,345	2.49
5	Washington Water Power.....	5,476,082	4,876,829	599,253	1	146,013	1,129,337	1,129,337	.....	4.32
6	Spokane and Montrose Motor.....	151,559	151,559	.....	.....	48,114	54,845	54,845	.....	2.76
7	Tacoma Railway and Power.....	*6,923,981	6,923,981	(⁹)	18	100,188	1,751,830	1,726,790	25,040	4.01
8	Northern Railway and Improvement.....	1,414,737	1,299,765	114,972	3	99,982	268,363	260,638	7,725	4.99
WEST VIRGINIA.										
Total for state.....		11 22,183,794	21,706,870	476,924	3	155,049	11 6,734,171	6,734,171	.....	3.22
1	Kanawha Valley Traction.....	288,729	288,729	.....	.....	40,438	82,000	82,000	.....	3.52
2	East Liverpool and Rock Springs.....	1,110,746	1,110,746	.....	.....	290,771	151,678	151,678	.....	7.32
3	Fairmont and Clarksburg.....	1,186,133	1,186,133	.....	.....	167,061	*593,066	593,066	.....	2.00
4	Camden Interstate Railway.....	4,219,383	4,219,383	.....	.....	139,576	*2,109,692	2,109,692	.....	2.00
5	Parkersburg, Marietta and Interurban.....	2,500,000	2,400,000	100,000	2	81,356	630,720	630,720	.....	3.81
6	Wheeling and Wellsburg.....	197,000	197,000	.....	.....	111,299	81,500	81,500	.....	2.42
7	Wheeling Traction.....	10 10,041,803	9,664,879	376,924	1	215,975	14 2,206,515	2,206,515	.....	4.38
8	Wheeling and Elm Grove.....	*2,640,000	2,640,000	.....	.....	162,462	*880,000	880,000	.....	3.38

¹ For 7 months only.² Estimated.³ For 3 companies only.⁴ For 20 companies only, and includes 3 companies operating part of year.⁵ For 18 companies only, and includes 3 companies operating part of year.⁶ For 14 months only.

GENERAL TABLES.

373

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.				MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, express, and other cars.	Fare passengers per car hour.	Mail carried.	In city limits.	Outside city limits.	Total.	Passengers.	Employees.	Others.	Killed.	Injured.	Killed.	Injured.	
78,840	78,840		12.13	No.	12	12	1		19						4
45,898	45,898		23.10	No.	10	25	2		1					3	5
41,402	41,402		46.96	No.	15	15			1						6
183,960	183,960		13.32	No.	7	50			87	1	55		13		19
				No.	7				25		9		3		18
185,120	185,120		34.11	No.	10	15	1		6						6
10,800	10,800		6.71	No.	6				97	1	72		10		15
				Yes	5	5									10
116,640	16,640		21.03	No.	12	12			1						11
256,726	250,448	8,278	21.04	No.	12	20			1		100		10		12
				No.	6									1	13
				No.	5	8	1		4		3		1		14
11,122	11,122		6.32	No.	4				1						15
11,455	11,455		5.55	No.	4		1								16
				No.											17
				No.			1	3	18	3	14		3		1
				No.	8				2		2				1
				Yes	12	20	1	3	15	3	12		3		2
				No.	10	18			1						3
47,981	45,164	2,817	21.24				3	2	3	1	2			1	1
32,850	32,850		21.62	Yes	10	10	1	2	1	1				1	1
8,976	8,976		15.73	Yes	8	15	1								2
				Yes	8	15			1		1				3
				No.	8										4
				No.	8	8									5
				Yes	8	15	1		1		1				6
6,155	3,338	2,817	32.26	Yes	10	30									7
				No.	8	18									8
				No.	8	8									9
1,536,137	1,527,377	8,760	27.32				13	9	340	1	163		1	24	158
17,280	17,280		26.49	No.	12	18	1								1
37,404	37,404		28.09	No.	12	15	1								2
				Yes	12	16									3
51,890	51,890		35.12	No.	12	15	1	1	1		1			1	4
39,420	39,420		25.04	No.	8	20			6		5				5
102,190	93,430	8,760	44.47	Yes	8	25	1		19		12				6
2,808	2,808		13.10	No.	7	30									7
46,622	46,622		23.64	No.	8	30	1	4	4	1	3		1	3	8
27,720	27,720		21.17	Yes	8	15	1		44		16		2		9
212,769	212,769		33.97	Yes	8	30	1	2	190		69		1	8	10
66,720	66,720		18.71	No.	8	20	1								11
7,410	7,410		14.84	No.	10	20	1		3		1				12
				No.	10	15			1					1	13
68,976	68,976		15.98	No.	10	20									14
6,022	6,022		21.08	No.	12										15
299,388	299,388		22.70	No.	8	20			28		21		3		16
326,232	326,232		29.17	No.	8	15		1	21		17		4	1	17
176,016	176,016		23.75	No.	8	20	4		13		12		1		18
45,810	45,810		25.59	No.	15	20	1		1				1		19
1,460	1,460		12.67	No.	6	6	1								20
				Yes	10	25			10		6			4	21
900,038	876,471	23,567	41.84				9	1	48		28		2	1	18
21,817	21,817		44.54	Yes	9	9		1	1					1	1
16,471	10,211	6,260	19.67	Yes	6	15	1								2
586,271	581,699	4,572	45.60	Yes	12	15	4								3
25,732	22,447	3,285	26.46	Yes	10	20			9		8		1		4
				No.	12	12	1								5
6,205	6,205		24.43	No.	9		1		27		20				6
198,384	190,812	7,572	36.29	Yes	10	25	1								7
45,158	43,280	1,878	30.03	Yes	10	15	1		11				1		8
156,171	156,171		25.59				7	12	12	2	1	2	1	8	10
16,425	16,425		17.58	No.	8	8		2	2					2	1
21,626	21,626		51.36	Yes	8		1	3	4	1			1	1	2
				No.	10			2						2	3
				No.	16	30	3		1	2				1	4
105,120	105,120		22.83	No.	8	15	1				1			1	5
13,000	13,000		15.15	No.	8										6
				Yes	10	10	1	3	3	1			1		7
				Yes	10	20	1		1						8

7 For 3 months only.
8 For 4 months only.
9 Not reported.
10 For 7 companies only.

11 Includes 1 company operating part of year.
12 For 4 companies only.
13 For 10 months only.

STREET AND ELECTRIC RAILWAYS.

TABLE 97.—PASSENGERS, CAR MILEAGE, CAR HOURS, MAXIMUM

Number.	STATE AND NAME OF COMPANY	NUMBER OF PASSENGERS CARRIED.			Transfer points.	Fare passengers per mile of single track.	CAR MILEAGE.			Fare passengers per car mile.
		Total.	Fare.	Transfer.			Total.	Passenger cars.	Freight, mail, express, and other cars.	
WISCONSIN.										
	Total for state.....	178,282,492	62,537,300	15,745,192	89	150,150	15,609,884	15,528,124	81,760	4.03
1	Wisconsin Traction, Light, Heat and Power.....	31,113,732	1,106,781	6,951	1	57,495	335,250	335,250		3.30
2	Ashland Light, Power and Street Railway.....	503,658	503,658			65,580	266,584	266,584		1.89
3	Chippewa Valley Electric Railroad.....	1,405,250	1,277,500	127,750	2	56,602	528,520	528,520		2.42
4	Fond du Lac Street Railway and Light.....	721,326	721,326			115,044	259,549	259,549		2.78
5	Fox River Electric Railway and Power.....	1,511,233	1,161,233	350,000	1	67,789	561,800	561,800		2.07
6	Janesville Street Railway.....	304,398	304,398		1	41,079	121,045	121,045		2.51
7	La Crosse City Railway.....	1,938,845	1,646,728	292,117	3	114,039	617,478	617,478		2.67
8	La Crosse and Onalaska.....	60,000	60,000			22,472	58,949	58,949		1.02
9	Madison Traction.....	1,787,705	1,520,160	267,545	2	178,842	401,500	401,500		3.79
10	Manitowoc and Northern.....	4395,100	391,200	3,900	1	45,330	152,880	152,880		2.56
11	Marquette Gas, Electric Light and Street Railway.....	574,370	574,370		2	106,365	191,457	191,457		3.00
12	Merrill Railway and Lighting.....	140,848	140,848			90,870	75,000	75,000		1.88
13	Milwaukee Electric Railway and Light.....	60,901,052	46,974,373	13,926,679	59	322,848	9,143,023	9,143,023		5.14
14	Milwaukee Light, Heat and Traction.....	3,807,593	3,387,394	420,199	12	36,597	1,496,220	1,496,220		2.26
15	Winnebago Traction.....	2,259,074	1,973,843	285,231	3	61,683	954,119	954,119		2.07
16	Sheboygan Light, Power and Railway.....	694,490	629,670	64,820	2	31,484	408,860	327,100	81,760	1.93
17	Waupaca Electric Light and Railway.....	163,818	163,818			33,162	37,650	37,650		4.35
HAWAII.										
	Total for territory.....	8,120,105	7,394,935	725,170	8	257,663	1,483,033	1,483,033		4.99
1	Hawaiian Tramways.....	3,443,638	3,443,638			286,970	735,448	735,448		4.68
2	Honolulu Rapid Transit and Land.....	4,576,467	3,851,297	725,170	3	271,218	721,585	721,585		5.34
3	Pacific Heights Electric Railway.....	100,000	100,000			40,000	26,000	26,000		3.85
PORTO RICO.										
	Total.....	2,241,930	2,241,930			178,498	430,376	430,376		5.21
1	Tramway Stock.....	307,650	307,650			98,291	71,014	71,014		4.33
2	San Juan Light and Transit.....	1,934,280	1,934,280			205,120	359,362	359,362		5.38

¹ Includes 2 companies operating part of year.² For 13 companies only, and includes 2 companies operating part of year.³ For 9 months only.

GENERAL TABLES.

375

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.			Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.			In city limits.	Outside city limits.		Total.		Passengers.		Employees.		Others.		
								Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	
*1,587,893	1,587,893		37.19				4	12	2,040		1,134		521	12	385	
34,870	34,870		31.74	No.	8	34			4				4			1
37,230	37,230		13.53	No.	8				1		1					2
52,560	52,560		24.31	No.	12	35		2	1					2	1	3
27,030	27,030		26.69	No.	8	10		1						1		4
64,090	64,090		18.12	No.	6	20		1	1					1		5
				No.	10				1				1			6
69,314	69,314		23.76	No.	16				25		1				24	7
5,736	5,736		10.46	No.	9	18										8
62,050	62,050		24.50	No.	8	8										9
*24,000	24,000		16.30	Yes	8	30										10
				No.	6	10		1	1	2		2			1	11
12,410	12,410		11.35	No.	12											12
1,050,977	1,050,977		44.70	No.	9	13		6	1,752		960		456	6	336	13
143,663	143,663		23.58	Yes	7	14			240		168		60		12	14
				No.	8	16		1	1	14		2		1	12	15
				Yes	7	10		1								16
3,963	3,963		41.34	No.	4	15										17
									2	10		2	10			
				No.	8											1
				No.	12				2	10		2	10			2
				No.		10										3
								1	2	7		2		1	2	4
				No.	(*)	(*)										1
				No.	5	6		1	2	7		2		1	2	4

* For 8 months only.

* Estimated.

* Not reported.

STREET AND ELECTRIC RAILWAYS.

TABLE 98.—WAGE-EARNERS, AT SPECIFIED DAILY RATES OF PAY AND

		ALL CLASSES.											
STATE.		Total.	Number at specified daily rates of pay.									Median rate (dollars).	
			Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.		\$3.00 and over.
1	United States	94,874	656	2,719	4,468	15,431	15,213	39,663	10,421	3,262	1,045	1,996	2.00 to 2.04
2	Alabama	311	51	15	164	28	32	7	2	6	1	5	1.45 to 1.49
3	Arkansas	215	11	30	71	63	13	5	14	4	2	2	1.35 to 1.39
4	California	4,611	2	24	63	245	300	2,810	570	200	123	274	2.20 to 2.24
5	Colorado	913			1	1	164	163	202	286	27	69	2.25 to 2.29
6	Connecticut	2,374		17	82	411	398	1,229	86	83	21	47	2.00 to 2.04
7	Delaware	226			6	15	9	172	9	11	2	2	2.00 to 2.04
8	Florida	185	14	70	3	38	16	24	11	4		5	1.50 to 1.54
9	Georgia	1,640	340	675	184	331	8	67	14	4	8	9	1.15 to 1.19
10	Illinois	5,130	1	13	168	1,043	645	2,242	681	136	84	117	2.00 to 2.04
11	Indiana	2,249	25	107	761	433	570	262	47	27	7	10	1.50 to 1.54
12	Iowa	1,344	25	58	155	491	398	88	51	48	6	24	1.60 to 1.64
13	Kansas	249		1	10	73	135	13	7	4	2	4	1.75 to 1.79
14	Kentucky	1,307	11	87	116	193	316	501	39	35		9	1.90 to 1.94
15	Louisiana	1,431	9	9	60	73	1,085	77	48	22	23	25	1.80 to 1.84
16	Maine	910		23	125	348	325	26	50	12		1	1.60 to 1.64
17	Maryland	115	1	19	20	23	28	23	1				1.70 to 1.74
18	Massachusetts	6,346		36	78	388	744	4,590	221	182	34	73	2.00 to 2.04
19	Michigan	2,913	8	277	106	641	365	1,279	137	45	15	41	2.00 to 2.04
20	Minnesota	1,408		7	28	369	751	110	118	13	6	6	1.80 to 1.84
21	Mississippi	122		20	20	39	23	9	4	1	3	3	1.55 to 1.59
22	Missouri	2,442		15	61	982	664	543	75	54	23	25	1.75 to 1.79
23	Montana	170	1					1	3	11	22	132	3.50 to 3.54
24	Nebraska	477			20	71	31	334	7	11	2	1	2.00 to 2.04
25	New Hampshire	354			4	44	181	108	4	7	1	5	1.75 to 1.79
26	New Jersey	3,693	3	48	75	462	823	1,987	136	138	26	45	2.00 to 2.04
27	New York	23,297	2	27	698	2,874	2,579	9,843	5,361	979	290	644	2.00 to 2.04
28	North Carolina	345	52	186	14	65	11	11	2	4			1.00 to 1.04
29	Ohio	6,949	26	38	281	1,311	1,495	2,822	710	179	38	49	2.00 to 2.04
30	Oregon	451		1		9	13	65	298	14	28	28	2.25 to 2.29
31	Pennsylvania	14,782	6	180	515	2,769	1,545	7,722	1,254	438	171	182	2.00 to 2.04
32	Rhode Island	217		1	2	32	19	78	71	8	1	5	2.10 to 2.14
33	South Carolina	338	30	53	67	141	15	18	5		1	8	1.50 to 1.54
34	Tennessee	1,135	5	500	67	233	230	44	18	15	9	14	1.25 to 1.29
35	Texas	744	4	53	76	298	192	60	31	14	7	9	1.65 to 1.69
36	Utah	331			7	6	170	129	2	4	9	4	1.80 to 1.84
37	Vermont	158		3	43	49	49	10	1	3			1.70 to 1.74
38	Virginia	802	2	91	68	224	225	143	22	20		7	1.75 to 1.79
39	Washington	1,089		13	13	15	161	585	29	161	30	82	2.00 to 2.04
40	West Virginia	534			54	218	21	208	14	9	1	9	1.60 to 1.64
41	Wisconsin	1,316	27	20	94	288	417	378	50	20	14	8	1.90 to 1.94
42	All other states ¹	1,251		2	89	94	47	927	21	50	8	13	2.00 to 2.04

¹Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

GENERAL TABLES.

377

MEDIAN RATE, ON ELECTRIC SURFACE RAILWAYS, BY STATES: 1902.

CONDUCTORS.											
Total.	Number at specified daily rates of pay.										Median rate (dollars).
	Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.	\$3.00 and over.	
31,869	50	899	1,046	3,983	5,426	17,059	3,124	192	17	73	2.00 to 2.04 1
84		2	74	8							1.45 to 1.49 2
55	10	5	40								1.35 to 1.39 3
1,620		12	9	98	47	1,231	221	2			2.20 to 2.24 4
296					47	42	78	120		9	2.25 to 2.29 5
758			12	75	136	527	8				2.00 to 2.04 6
82						82					2.00 to 2.04 7
56		34		14	8						1.10 to 1.14 8
481		282	75	124							1.15 to 1.19 9
2,057			60	468	142	1,057	300	9		21	2.10 to 2.14 10
637		25	252	51	227	82					1.70 to 1.74 11
356	13	14	61	170	98						1.50 to 1.54 12
54			1	7	46						1.75 to 1.79 13
290		43	13	13	136	85					1.90 to 1.94 14
525				5	514	5	1				1.80 to 1.84 15
258		6	59	79	112	2					1.50 to 1.54 16
36		5	9		15	7					1.75 to 1.79 17
2,239			17	8	175	2,039					2.00 to 2.04 18
880		140	13	102	76	532	17				2.10 to 2.14 19
475		5		188	280	2					1.80 to 1.84 20
28			5	13	10						1.65 to 1.69 21
860		6	3	407	227	217					1.80 to 1.84 22
60								1	16	43	3.50 to 3.54 23
170				30		140					2.00 to 2.04 24
123			2		81	40					1.75 to 1.79 25
1,213				73	387	753					2.00 to 2.04 26
8,089		8	87	718	1,098	4,591	1,587				2.00 to 2.04 27
93	6	58		29							1.00 to 1.04 28
2,341	7	11	65	188	596	1,216	245	12	1		2.00 to 2.04 29
148				1	5		142				2.25 to 2.29 30
4,942		26	77	589	433	3,358	458	1			2.00 to 2.04 31
92				4	6	31	51				2.25 to 2.29 32
112		25	27	60							1.50 to 1.54 33
385	4	167		105	107	2					1.50 to 1.54 34
197		6	4	94	67	18	8				1.70 to 1.74 35
90					39	51					2.00 to 2.04 36
56			14	16	23	2					1.70 to 1.74 37
260		4	10	86	110	50					1.80 to 1.84 38
349		6	6	5	32	245	8	47			2.00 to 2.04 39
175			32	54		89					2.00 to 2.04 40
397	10	9	19	97	154	108					1.80 to 1.84 41
451				4		447					2.00 to 2.04 42

STREET AND ELECTRIC RAILWAYS.

TABLE 98.—WAGE-EARNERS, AT SPECIFIED DAILY RATES OF PAY AND

STATE.		MOTORMEN.											Median rate (dollars).
		Total.	Number at specified daily rates of pay.										
			Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.	\$3.00 and over.	
1	United States.....	32,412	23	884	1,123	3,374	5,481	16,665	4,325	291	7	239	2.00 to 2.04
2	Alabama.....	88		2	82	4							1.45 to 1.49
3	Arkansas.....	82		22	7	42	11						1.50 to 1.54
4	California.....	1,623			14	107	46	1,233	221	2			2.20 to 2.24
5	Colorado.....	302					47	46	78	122		9	2.25 to 2.29
6	Connecticut.....	759		12		71	142	523	10	1			2.00 to 2.04
7	Delaware.....	82						82					2.00 to 2.04
8	Florida.....	57		34		14		9					1.10 to 1.14
9	Georgia.....	510		286	82	142							1.15 to 1.19
10	Illinois.....	1,751			69	277	190	974	211	14		16	2.00 to 2.04
11	Indiana.....	668		15	255	79	256	63					1.65 to 1.69
12	Iowa.....	420	2	23	37	129	229						1.75 to 1.79
13	Kansas.....	95				17	78						1.75 to 1.79
14	Kentucky.....	557		15	73	17	141	311					2.00 to 2.04
15	Louisiana.....	532				12	514	5	1				1.80 to 1.84
16	Maine.....	258		6	57	79	113	3					1.50 to 1.54
17	Maryland.....	42		4		13	13	12					1.75 to 1.79
18	Massachusetts.....	2,185			17	7	174	1,980	7				2.00 to 2.04
19	Michigan.....	931		130	27	123	86	534	31				2.10 to 2.14
20	Minnesota.....	482			11	152	317	2					1.80 to 1.84
21	Mississippi.....	32			6	16	10						1.55 to 1.59
22	Missouri.....	829		2	3	312	291	221					1.80 to 1.84
23	Montana.....	55						1		1	6	47	3.50 to 3.54
24	Nebraska.....	187				40	3	144					2.00 to 2.04
25	New Hampshire.....	123			2		81	40					1.75 to 1.79
26	New Jersey.....	1,194				69	278	847					2.00 to 2.04
27	New York.....	7,799		6	70	381	679	3,602	2,806	88		167	2.00 to 2.04
28	North Carolina.....	93	6	58		29							1.00 to 1.04
29	Ohio.....	2,425		20	54	235	610	1,234	255	16	1		2.00 to 2.04
30	Oregon.....	149				7			142				2.25 to 2.29
31	Pennsylvania.....	5,380		23	83	437	592	3,716	528	1			2.00 to 2.04
32	Rhode Island.....	59				4	6	31	18				2.10 to 2.14
33	South Carolina.....	112		15	37	60							1.50 to 1.54
34	Tennessee.....	399		147	42	100	106	4					1.50 to 1.54
35	Texas.....	307	2	46	9	120	104	18	8				1.60 to 1.64
36	Utah.....	103					39	63	1				2.00 to 2.04
37	Vermont.....	56			16	15	23	2					1.70 to 1.74
38	Virginia.....	249		4	11	76	98	60					1.80 to 1.84
39	Washington.....	353		6	6	5	35	247	8	46			2.00 to 2.04
40	West Virginia.....	175				86		89					2.00 to 2.04
41	Wisconsin.....	466	13	8	53	93	169	130					1.80 to 1.84
42	All other states ¹	443				4		439					2.00 to 2.04

¹ Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

GENERAL TABLES.

379

MEDIAN RATE, ON ELECTRIC SURFACE RAILWAYS, BY STATES: 1902—Continued.

ROAD AND TRACKMEN.											
Total.	Number at specified daily rates of pay.										Median rate (dollars).
	Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.	\$3.00 and over.	
9,926	473	477	1,368	4,505	1,280	1,229	384	162	8	40	1.50 to 1.54 1
51	51										Less than 1.00 2
19			15	4							1.25 to 1.29 3
367			35	7	95	170	25	24	4	7	2.00 to 2.04 4
130				1	55	61	3	6	3	1	2.00 to 2.04 5
312			63	198	31	15	3	2			1.50 to 1.54 6
17			6	10				1			1.50 to 1.54 7
13	11	2									Less than 1.00 8
378	330	48									Less than 1.00 9
272		5	27	108	85	26	16	5			1.65 to 1.69 10
355	13	21	199	120	2						1.25 to 1.29 11
188		11	26	117	21	3	8	2			1.60 to 1.64 12
45			5	39		1					1.50 to 1.54 13
165	11	17	6	130	1						1.50 to 1.54 14
85		3	41	24	1	16					1.25 to 1.29 15
159		6		102	51						1.50 to 1.54 16
14		4	9	1							1.25 to 1.29 17
589		8	11	239	203	99	15	6		8	1.75 to 1.79 18
343	1		21	267	32		18			4	1.50 to 1.54 19
159			1		82	76					1.90 to 1.94 20
19		17	1		1						1.10 to 1.14 21
231			43	168	15	4				1	1.50 to 1.54 22
19							3	5		11	3.00 to 3.04 23
21			15		6						1.40 to 1.44 24
35				30	3	1		1			1.50 to 1.54 25
252		2	62	143	24	9		6		6	1.50 to 1.54 26
2,567		3	292	975	294	635	281	87			1.75 to 1.79 27
59	25	30		2	2						1.00 to 1.04 28
693		1	120	527	26	11	1	6	1		1.50 to 1.54 29
52						52					2.00 to 2.04 30
1,529	1	94	231	1,111	61	11	8	10		2	1.50 to 1.54 31
18		1		17							1.50 to 1.54 32
34	28	5		1							Less than 1.00 33
141		140		1							1.00 to 1.04 34
115	1		54	57	2			1			1.50 to 1.54 35
89				3	86						1.75 to 1.79 36
19		2	7	8	2						1.50 to 1.54 37
70	1	56	6	6	1						1.00 to 1.04 38
91				2	61	26					1.80 to 1.84 39
62			17	43	1	1					1.50 to 1.54 40
73		1	6	22	33	8	3				1.75 to 1.79 41
76			49	22	3	2					1.25 to 1.29 42

STREET AND ELECTRIC RAILWAYS.

TABLE 98.—WAGE-EARNERS AT SPECIFIED DAILY RATES OF PAY, AND

		ENGINEERS.											
STATE.		Total.	Number at specified daily rates of pay.									Median rate (dollars).	
			Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.		\$3.00 and over.
1	United States	1,534	3	5	39	104	89	295	187	274	115	423	2.50 to 2.54
2	Alabama	8				1	2		2			3	2.25 to 2.29
3	Arkansas	12			2	2		2	1	3	1	1	2.30 to 2.34
4	California	50						2		9	2	37	3.25 to 3.29
5	Colorado	21						1		8	2	10	2.75 to 2.79
6	Connecticut	57					2	15	6	12	5	17	2.50 to 2.54
7	Delaware	8					1	2	1	1	2	1	2.50 to 2.54
8	Florida	8			1			1		3		3	2.50 to 2.54
9	Georgia	23			3	1		5	1	1	8	4	2.80 to 2.84
10	Illinois	80		2	1	2	2	14	7	26	9	17	2.50 to 2.54
11	Indiana	54				4	10	19	6	8	3	4	2.00 to 2.04
12	Iowa	41	3		3	3	10	7	8	3		4	2.00 to 2.04
13	Kansas	12				1	4	2	2			3	2.00 to 2.04
14	Kentucky	20			4	3		4		2		7	2.00 to 2.04
15	Louisiana	23					2	1	2	1	10	7	2.95 to 2.99
16	Maine	32			6	2		5	12	7			2.25 to 2.29
17	Maryland	6		1		2		2	1				1.50 to 1.54
18	Massachusetts	138		1			4	20	22	42	15	34	2.50 to 2.54
19	Michigan	59				8	5	8	7	8	6	17	2.50 to 2.54
20	Minnesota	14						9		1	3	1	2.15 to 2.19
21	Mississippi	8				1	1	1		1	2	2	2.50 to 2.54
22	Missouri	49				16		2	12	7	5	7	2.25 to 2.29
23	Montana	3										3	4.00 to 4.04
24	Nebraska	4						2	1		1		2.25 to 2.29
25	New Hampshire	10						4	1	1	1	3	2.50 to 2.54
26	New Jersey	39					3	8	4	15	1	8	2.50 to 2.54
27	New York	188			2	9	13	40	11	26	10	77	2.65 to 2.69
28	North Carolina	18		1	1	2	3	5	2	4			2.00 to 2.04
29	Ohio	148			2	9	10	26	36	33	8	24	2.30 to 2.34
30	Oregon	7					1		1	1		4	3.00 to 3.04
31	Pennsylvania	218			11	16	3	53	19	22	12	82	2.50 to 2.54
32	Rhode Island	7							2	3		2	2.55 to 2.59
33	South Carolina	9				2		1				6	3.00 to 3.04
34	Tennessee	16				5		2	1	1	4	3	2.25 to 2.29
35	Texas	13					1	5		5	1	1	2.50 to 2.54
36	Utah	2						1	1				2.15 to 2.19
37	Vermont	4				2		1	1				2.15 to 2.19
38	Virginia	36			3	10	1	4	5	9		4	2.30 to 2.34
39	Washington	21							3			18	3.00 to 3.04
40	West Virginia	26					9	8	4	1		4	2.00 to 2.04
41	Wisconsin	28				3	2	11	4	5	3		2.05 to 2.09
42	All other states ¹	14						2	1	5	1	5	2.65 to 2.69

¹ Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

GENERAL TABLES.

371

SPEED, ACCIDENTS, ETC., BY COMPANIES: 1902—Continued.

CAR HOURS.				Fare passen- gers per car hour.	Mail carried.	MAXIMUM SPEED OF CARS, MILES PER HOUR.		Pleasure parks, number owned or operated.	ACCIDENTS.								Number.
Total.	Passenger cars.	Freight, mail, ex- press, and other cars.	In city limits.			Outside city limits.	Total.		Passengers.	Employees.	Others.						
									Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	
70,065	70,065		34.23	No.	Yes	10	13	1		15				7			56
52,640	52,640		44.23	No.	No	8			1	30	1	10		3		17	57
42,894	42,894		36.56	No.	No	12	18			11		1		2		8	58
				No.	No	8	15										59
				Yes	Yes	15	30	2	79	1,054	14	496	4	104	61	454	60
				No.	No	4											61
				No.	No	4											62
				No.	No	14											63
				No.	No	22											64
				No.	No	3											65
				No.	No	10	27	1	2	2							66
				Yes	Yes	10	15	1	7	103	1	56	1	12	5	35	67
25,556	25,556		28.02	Yes	Yes	6	10	1	1	16		16			1		68
				No.	No	5	7	1									69
118,082	118,082		28.57	Yes	Yes	8	15	1		9		5				4	70
				Yes	Yes	8	12	1	1						1		71
239,440	239,440		38.31	No	Yes	7	10	1	3	68		38		3	3	27	72
				Yes	Yes	15				1		1					73
5,884	5,884		12.36	No.	No	7	10										74
8,640	8,640		7.52	No.	No	12		1									75
334,020	334,020		24.94	Yes	Yes	8	14			122		73		9		40	76
41,610	41,610		47.21	No.	No	6	15	1									77
18,767	18,767		29.33	No.	No	8	10	1									78
5,758	5,758		21.04	Yes	Yes	10											79
12,045	12,045		26.15	No.	No	8	12										80
39,420	39,420		26.13	Yes	Yes	6	15	1									81
				No.	No	15											82
				Yes	Yes	10	15										83
45,625	45,625		29.44	No.	No	6	15	1		3		2		1			84
				No.	No	6											85
				Yes	Yes	8	15	1									86
303,220	303,220		43.20	No.	No	8	15	1	5	193		131		4	5	38	87
13,140	13,140		69.79	No.	No	8	14	1	1	34		28			1	6	88
				No.	No	8	8	1									89
				No.	No	8											90
				No.	No	8											91
				No.	No	8											92
				No.	No	8	8										93
720	720		12.38	No.	No	8	25										94
6,570	6,570		20.07	No.	No	8	15			5						5	95
				Yes	Yes	7	12										96
				Yes	Yes	7	12										97
				No.	No	7	12	1									98
36,500	29,200	7,300	22.30						17	190		135	2	11	15	44	
				No.	No		25		1	11			1	2	1	6	1
				No.	No	12			1			3					2
				Yes	Yes	12	25		11	145		111	1	1	10	33	3
36,500	29,200	7,300	22.30	Yes	Yes	12	25		2	17		9		5	2	3	4
				Yes	Yes	12	12		1	4		3		1	1		5
				Yes	Yes	8	8										6
				Yes	Yes	8	20		1	13		9		2	1	2	7
																	8
49,418	49,418		26.61					4	4	100	1	36		21	3	40	
				No.	No	10	10	1		2		2					1
				Yes	Yes	8	15		1	80		29		22	1	29	2
				No.	No	15	20	2	1	17	1	5		2		10	3
23,156	23,156		23.22	No.	No	15	15										4
				No.	No	6											5
26,262	26,262		29.61	Yes	Yes	15	15	1	2	1					2	1	6
																	7
																	1
783,406	779,755	3,650	21.28					8	21	550	3	247	6	86	12	217	
				No.	No	6	12										1
164,980	164,250	730	20.27	Yes	Yes	8	15	1	3	30	1	15	1	3	1	12	2
				No.	No	10	25		4	36		30	3	3	1	3	3
18,615	18,615		16.12	No.	No	8	15	2									4
				No.	No	8		2		1							5
136,990	136,990		17.91	No.	No	8	12	2	2	35		5	1	14	1	16	6
				Yes	Yes	15	20		6	96	2	40		5	4	51	7
462,820	459,900	2,920	22.86	Yes	Yes	9	14	1	6	352		157	1	60	5	135	8
*1,147,571	1,139,293	8,278	22.41					7	7	424	2	277	1	48	4	99	
67,000	67,000		18.11	No.	No	10		1	1	3				2	1	1	1
6,570	6,570		22.49	No.	No	10	15										2
230,038	230,038		24.42	No.	No	20	20		1	60		25		6	1	29	3

* For 2 companies only.

* This company failed to make a report.

* For 4 companies only.

* For 13 companies only, and includes 1 company operating part of year.

STREET AND ELECTRIC RAILWAYS.

TABLE 98.—WAGE-EARNERS AT SPECIFIED DAILY RATES OF PAY, AND

		MECHANICS.											
STATE.		Total.	Number at specified daily rates of pay.									Median rate (dollars).	
			Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.		\$3.00 and over.
1	United States	6,753	21	88	195	896	1,062	1,707	1,017	936	427	409	2.00 to 2.04
2	Alabama.....	33				2	30			1			1.90 to 1.94
3	Arkansas	14					1		12			1	2.30 to 2.34
4	California.....	407		6	3	8	29	59	28	87	73	114	2.50 to 2.54
5	Colorado	37						1	11	6	9	10	2.75 to 2.79
6	Connecticut	161		1	2	12	38	38	21	31	9	9	2.00 to 2.04
7	Delaware	10					1		7	2			2.25 to 2.29
8	Florida	11				1	9	1					1.75 to 1.79
9	Georgia	82	5	1	4	9	1	4	4	1		3	1.50 to 1.54
10	Illinois.....	308			2	3	15	64	108	49	43	24	2.25 to 2.29
11	Indiana	221	1	31	27	57	33	59	9	3	1		1.60 to 1.64
12	Iowa	117			5	21	8	42	4	25	2	10	2.00 to 2.04
13	Kansas	10				2		2	4	2			2.25 to 2.29
14	Kentucky.....	98			1		12	85					2.00 to 2.04
15	Louisiana.....	97		3	2	1	8	43	16	10	5	9	2.00 to 2.04
16	Maine	39			2	25	10	2					1.60 to 1.64
17	Maryland	4		1		1		2					1.50 to 1.54
18	Massachusetts	519		12	24	60	74	227	72	42	5	3	2.00 to 2.04
19	Michigan	271	6	2	1	47	57	116	28	11	1	2	2.00 to 2.04
20	Minnesota	120		2		11	9	6	84	1	3	4	2.25 to 2.29
21	Mississippi	5			1	2		1	1				1.50 to 1.54
22	Missouri	163			2	15	46	51	25	11	4	9	2.00 to 2.04
23	Montana	8								1		7	4.00 to 4.04
24	Nebraska	52					5	45		2			2.00 to 2.04
25	New Hampshire	19				1	4	11	2	1			2.00 to 2.04
26	New Jersey	424		11	3	65	98	78	74	78	13	4	2.00 to 2.04
27	New York.....	1,816	1	2	44	210	125	163	258	274	125	114	2.25 to 2.29
28	North Carolina	8	2	5				1					1.00 to 1.04
29	Ohio	507	3		2	115	78	167	94	31	11	6	2.00 to 2.04
30	Oregon	43								6	27	10	2.75 to 2.79
31	Pennsylvania	1,213	3	2	36	160	304	299	113	203	65	28	2.00 to 2.04
32	Rhode Island	5				3	2						1.55 to 1.59
33	South Carolina	10			1	7	1					1	1.50 to 1.54
34	Tennessee	66		3	6	4	8	22	7	7	4	5	2.00 to 2.04
35	Texas	43			4	11	5	9	7	1	3	3	2.00 to 2.04
36	Utah	32			7		2	13			8	2	2.00 to 2.04
37	Vermont.....	3			1		1			1			1.75 to 1.79
38	Virginia	31		1	5	4	7	4	7	1		2	1.75 to 1.79
39	Washington.....	61						28		10	1	22	2.50 to 2.54
40	West Virginia.....	20			1	6		5	5	2	1		2.00 to 2.04
41	Wisconsin.....	103			8	4	18	40	12	9	7	5	2.00 to 2.04
42	All other states ¹	112			1	29	23	19	4	28	6	2	2.00 to 2.04

¹Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1.

GENERAL TABLES.

383

MEDIAN RATE, ON ELECTRIC SURFACE RAILWAYS, BY STATES: 1902—Continued.

ALL OTHER CLASSES.											
Total.	Number at specified daily rates of pay.										Median rate (dollars).
	Less than \$1.00.	\$1.00 to \$1.24.	\$1.25 to \$1.49.	\$1.50 to \$1.74.	\$1.75 to \$1.99.	\$2.00 to \$2.24.	\$2.25 to \$2.49.	\$2.50 to \$2.74.	\$2.75 to \$2.99.	\$3.00 and over.	
10,086	70	296	562	2,100	1,223	1,963	1,213	1,359	470	791	2.00 to 2.04
37		9	5	8		7		6		2	1.70 to 1.74
17	1		4	5	1	3	1	1	1		1.65 to 1.69
452	2	6	2	21	74	61	52	74	44	116	2.50 to 2.54
90			1		15	9	7	18	13	27	2.50 to 2.54
271		4	5	53	36	71	37	37	7	21	2.00 to 2.04
17				1	5	2	1	7		1	2.25 to 2.29
33	1		2	6	7	3	11	1		2	2.00 to 2.04
186	3	39	15	51	7	58	9	2		2	1.65 to 1.69
539	1	6	7	167	129	89	36	33	32	39	1.75 to 1.79
262	11	15	14	100	27	38	32	16	3	6	1.60 to 1.64
160	3	6	19	26	18	27	29	18	4	10	2.00 to 2.04
23		1	2	3	6	5	1	2	2	1	1.75 to 1.79
145		7	12	28	8	16	39	33		2	2.25 to 2.29
144	9	3	15	23	33	5	28	11	8	9	1.95 to 1.99
135		3	1	49	24	14	38	5		1	1.85 to 1.89
8	1	1		6							1.50 to 1.54
498		15	7	49	49	157	89	90	14	28	2.00 to 2.04
362	1	5	41	71	79	79	34	26	8	18	1.80 to 1.84
134			16	15	43	14	34	11		1	1.90 to 1.94
19		2	5	3	1	3	3		1	1	1.70 to 1.74
247		6	9	44	61	31	38	36	14	8	2.00 to 2.04
21	1							3		17	3.50 to 3.54
26			5	1		3	6	9	1	1	2.25 to 2.29
38				11	10	10	1	4		2	1.85 to 1.89
503	3	35	10	94	24	201	58	39	12	27	2.10 to 2.14
2,789	1	7	184	524	292	521	342	477	155	286	2.00 to 2.04
56	7	23	12	3	6	5					1.15 to 1.19
632	16	6	27	188	72	140	78	73	15	17	2.00 to 2.04
37		1		1	5	6	2	7	1	14	2.50 to 2.54
1,171	2	32	46	375	79	171	116	198	94	58	2.00 to 2.04
26			2	2	2	11		5	1	3	2.10 to 2.14
53	2	6	2	11	8	17	5		1	1	1.85 to 1.89
109	1	33	16	12	9	14	10	7	1	6	1.50 to 1.54
53		1	2	12	5	10	8	7	3	5	2.00 to 2.04
13				1	4	1		4	1	2	2.60 to 2.64
19			5	8		4		2			1.50 to 1.54
127		18	22	33	8	25	10	10		1	1.65 to 1.69
177		1	1	3	29	8	6	58	29	42	2.50 to 2.54
53			4	17		16	5	6		5	2.00 to 2.04
215	4	2	4	40	41	80	31	6	4	3	2.00 to 2.04
139		2	38	35	6	18	16	17	1	6	1.50 to 1.54

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES.

Number.	STATE AND NAME OF COMPANY.	BRIDGES.												TUNNELS.	
		TOTAL.		Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.					
		Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.		
UNITED STATES.....		2,748	480,912	1,024	156,061	574	57,152	931	242,458	192	5,438	27	19,803		
ALABAMA.															
Total for state.....		29	2,556			6	180	18	2,454	5	222				
1	Anniston Electric and Gas.....	9	476					4	254	5	222				
2	Birmingham Railway, Light and Power.....	10	2,140					10	2,140						
4	Alabama City, Gadsden and Attalla.....	2	120			2	120								
5	Huntsville Railway, Light and Power.....	2	12			2	12								
6	Mobile Light and Railroad.....	4	60					4	60						
9	Tuscaloosa Belt Railway.....	2	48			2	48								
ARIZONA.															
Total for territory.....		9	225					9	225						
1	Phoenix Railway.....	6	75					6	75						
2	Tucson Street Railway.....	3	150					3	150						
ARKANSAS.															
Total for state.....		8	949			3	140	5	809						
2	Fort Smith Traction.....	1	24					1	24						
3	Fort Smith and Van Buren.....	1	20			1	20								
5	Little Rock Traction and Electric.....	2	120			2	120								
6	Citizens Light and Transit.....	4	785					4	785						
CALIFORNIA.															
Total for state.....		57	11,913	6	4,947	38	4,121	7	1,782	3	300	3	763		
6	Los Angeles Railway.....	4	4,400	4	4,400										
7	Los Angeles and Pasadena.....	5	2,445	2	547	2	1,133	1	765						
14	Oakland Transit Consolidated.....	2	816					2	816						
15	Ontario and San Antonio Heights.....	2	200							2	200				
16	Pasadena and Mt. Lowe.....	20	1,328			20	1,328								
20	Redlands Street Railway.....	3	96			2	60	1	36						
21	Riverside and Arlington.....	2	40					2	40						
22	Sacramento Electric, Gas and Railway.....	2	50												
23	San Bernardino Valley.....	3	460			3	460								
28	United Railroads of San Francisco.....	4	625					1	125	1	100	2	400		
30	San Jose and Santa Clara.....	8	813			7	450					1	363		
33	East Santa Cruz.....	2	640			2	640								
COLORADO.															
Total for state.....		26	8,094	5	6,380	9	420	12	1,294						
2	Colorado Springs and Cripple Creek.....	6	944					6	944						
3	Colorado Springs Rapid Transit.....	11	670	2	250	9	420								
4	Denver, Lakewood and Golden.....	7	480	1	130			6	350						
5	Denver City Tramway.....	2	6,000	2	6,000										
CONNECTICUT.															
Total for state.....		57	5,900	35	3,680	7	544	12	1,624	3	52				
1	Branford Lighting and Water.....	1	175			1	175								
2	Connecticut Railway and Lighting.....	13	2,500	6	1,200			7	1,300						
3	Bristol and Plainville Tramway.....	5	240	1	85	3	30	1	125						
5	Greenwich Tramway.....	1	146	1	146										
6	Hartford and Springfield.....	2	340	1	40	1	300								
7	Farmington Street Railway.....	2	165	1	140	1	25								
8	Hartford Street Railway.....	10	507	4	342	1	14	2	99	3	52				
9	Hartford, Manchester and Rockville.....	7	425	7	425										
11	Meriden, Southington and Compounce.....	4	240	4	240										
15	Fair Haven and Westville.....	2	100					2	100						
17	Montville Street Railway.....	4	530	4	530										
19	Peoples Tramway.....	3	182	3	182										
23	Torrington and Winchester.....	3	350	3	350										
DELAWARE.															
Total for state.....		19	2,366	7	1,421	1	300	11	645						
1	Wilmington and New Castle.....	6	470	2	375			4	95						
2	Peoples Railway.....	10	985	4	485	1	300	5	200						
3	Wilmington City.....	3	911	1	561			2	350						
DISTRICT OF COLUMBIA.															
Total for District.....		25	3,912	22	3,841	3	71								
3	Capital Traction.....	2	1,117	2	1,117										
4	City and Suburban of Washington.....	4	239	2	212	2	27								
5	Columbia Railway.....	5	677	4	633	1	44								
6	Georgetown and Tennallytown.....	1	12	1	12										
8	Washington and Great Falls.....	13	1,867	13	1,867										
FLORIDA.															
Total for state.....		2	270					2	270						
2	Jacksonville Electric.....	1	220					1	220						
6	Tampa Electric.....	1	50					1	50						

GENERAL TABLES.

385

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES—Continued.

Number.	STATE AND NAME OF COMPANY.	BRIDGES.										TUNNELS.	
		TOTAL.		Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.			
		Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.
GEORGIA.													
	Total for state	18	400			7	150	10	300	1	10		
4	Columbus Railroad	9	250					9	250				
5	Covington and Oxford	3	30			3	30						
6	Macon Railway and Light	2	60					1	50	1	10		
8	Savannah Electric	4	120			4	120						
ILLINOIS.													
	Total for state	101	17,320	48	3,599	5	875	40	6,819	3	56	5	5,971
2	Elgin, Aurora and Southern	3	1,560	1	40	1	720	1	800				
3	Bloomington and Normal	3	60	3	60								
10	Chicago Union Traction	3	5,393									3	5,393
11	Chicago Consolidated Traction	4	1,800					4	1,800				
12	Calumet Electric Street Railway	1	538									1	538
13	Chicago Electric Traction	3	40	3	40								
16	Suburban Railroad	2	120			2	120						
19	Metropolitan West Side Elevated	1	174		174								
21	Chicago and Milwaukee	10	920	4	80			5	800			1	40
22	Lake Street Elevated Railroad	1	125	1	125								
23	Chicago and Joliet	27	800	27	800								
26	Danville, Paxton and Northern	2	210	1	150			1	60				
29	St. Louis and Belleville	1	1,200					1	1,200				
30	East St. Louis and Suburban	14	1,657	1	103			13	1,554				
34	Galesburg Electric Motor	1	150					1	150				
40	Coal Belt Electric Railway	6	140					6	140				
42	Ottawa Railway, Light and Power	3	75					3	75				
43	Peoria and Prospect Heights	1	350	1	350								
44	Central Railway	3	76	1	40	1	20			1	16		
45	Peoria and Pekin Terminal	4	1,319	2	1,154	1	15	1	150				
48	Rockford and Belvidere	8	613	2	483			4	90	2	40		
INDIANA.													
	Total for state	142	9,699	58	6,332	27	564	53	2,556	3	125	1	120
4	Fort Wayne Traction	4	200					4	200				
5	Fort Wayne and Southwestern	14	590	1	80			12	390			1	120
9	Indianapolis, Shelbyville and Southeastern	28	1,250	10	960	18	300						
10	Indianapolis and Eastern	6	110	1	60	5	50						
11	Union Traction	44	2,901	31	2,226			13	675				
12	Indianapolis, Greenwood and Franklin	3	135					2	90	1	45		
14	Kokomo Railway and Light	2	24			2	24						
15	Lafayette Street Railway	2	1,000	2	1,000								
20	Highland Railroad	2	150					2	150				
22	Richmond Street and Interurban	7	885	5	600	1	175			1	60		
23	Indiana Railway	11	905					10	885	1	20		
24	Terre Haute Electric	8	1,391	7	1,376	1	15						
26	Wabash River Traction	11	208	1	40			10	168				
IOWA.													
	Total for state	45	9,307	7	5,320	22	3,474	16	513				
1	Boone Electric	3	200			3	200						
3	Cedar Rapids and Marion City	2	270			1	64	1	206				
6	Omaha and Council Bluffs	2	3,328	1	3,266	1	60						
7	Tri-City Railway	2	536	2	536								
8	Des Moines City Railway	1	600	1	600								
9	Interurban Railway	14	1,800			14	1,800						
10	Union Electric	12	107					12	107				
16	Mason City and Clear Lake	3	200					3	200				
20	Sioux City Traction	4	950	2	600	2	350						
22	Waterloo and Cedar Falls	2	1,318	1	318	1	1,000						
KANSAS.													
	Total for state	19	3,187	2	380	7	2,400	5	132	5	275		
5	Iola Electric Railroad	8	375					3	100	5	275		
6	Electric Railway and Ice	1	320	1	320								
8	Pittsburg Railroad	1	300			1	300						
10	Topeka Railway	4	1,160	1	60	3	1,100						
11	Wichita Railroad and Light	5	1,032			3	1,000	2	32				
KENTUCKY.													
	Total for state	11	1,140	3	420	2	125	6	595				
2	Cincinnati, Newport and Covington	4	325	1	250			3	75				
5	Lexington Railway	1	30	1	30								
6	Georgetown and Lexington	1	105			1	105						
8	Louisville, Anchorage and Pewee	2	210	1	140			1	70				
10	Maysville Street Railroad	2	450					2	450				
12	Paducah City Railway	1	20			1	20						
LOUISIANA.													
	Total for state	1	150			1	150						
8	Shreveport Belt Railway	1	150			1	150						
MAINE.													
	Total for state	31	10,665	10	1,684	4	1,350	17	7,631				
3	Penobscot Central Railway	2	200			2	200						
4	Bangor, Orono and Old Town	3	212	2	200			1	12				
5	Bangor, Hampden and Winterport	1	54					1	54				
8	Benton and Fairfield	2	300	2	300								

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES—Continued.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		BRIDGES.								TUNNELS.	
				Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.			
		Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.
MAINE—Continued.													
11	Lewiston, Brunswick and Bath	3	1,526	2	986	1	540						
13	Portland Railroad	2	538	1	88			1	500				
14	Portsmouth, Kittery and York	8	5,240	2	100	1	610	5	4,530				
15	Rockland, Thomaston and Camden	1	1,300					1	1,300				
16	Sanford and Cape Porpoise	3	760	1	60			2	700				
17	Skowhegan and Norridgewock Railway and Power	2	100					2	100				
18	Somerset Traction	3	375					3	375				
19	Waterville and Fairfield Railway and Light	1	60					1	60				
MARYLAND.													
	Total for state	45	23,859	19	9,225	17	12,084	8	2,510	1	40		
1	United Railways	25	21,000	13	9,000	12	12,000						
3	Frederick and Middletown	7	1,850					7	1,850				
4	Kensington Railway	2	700					1	660	1	40		
7	Baltimore and Washington	1	50	1	50								
8	Washington and Glen Echo	8	197	3	113	5	84						
9	Washington and Rockville	2	62	2	62								
MASSACHUSETTS.													
	Total for state	232	32,594	107	11,187	47	3,347	32	8,806	45	640	1	8,554
1	Amherst and Sunderland	9	400	2	33	3	147			4	220		
3	Lexington and Boston	3	54	3	54								
4	Old Colony Street Railway	16	3,317	9	1,103	1	32	6	2,182				
5	Boston and Northern	14	1,901	6	949	3	57	5	895				
6	Boston Elevated Railway	1	8,554									1	8,554
7	Lowell and Boston	3	474	1	52	1	20	1	402				
9	Blue Hill Street Railway	1	40			1	40						
10	Hoosac Valley	5	270	3	160			1	70	1	40		
11	Concord, Maynard and Hudson	4	475	1	100			3	375				
12	Conway Electric Railway	3	686	3	686								
16	Providence and Fall River	7	650	4	160	2	40	1	450				
17	Dartmouth and Westport	1	195			1	195						
18	Fitchburg and Leominster	2	154	2	154								
20	Gardner, Westminster and Fitchburg	3	80			2	50			1	30		
21	Greenfield and Turners Falls	2	800	1	600	1	200						
23	Haverhill, Georgetown and Danvers	1	500			1	500						
24	Haverhill and Amesbury	1	20			1	20						
25	Holyoke Street Railway	1	40	1	40								
26	Lawrence and Reading	2	87					2	87				
28	Middleton and Danvers	1	150	1	150								
29	Norfolk and Bristol	1	50					1	50				
32	Medfield and Medway	1	80			1	80						
33	Middleboro, Wareham and Buzzards Bay	9	1,587	3	88	6	1,499						
35	Milford and Uxbridge	7	700	6	500			1	200				
37	South Middlesex Street Railway	4	150	2	75	2	75						
39	New Bedford and Onset	1	60	1	60								
40	Citizens Electric Railway	2	100	2	100								
41	Georgetown, Rowley and Ipswich	2	325	1	300	1	25						
46	Northampton Street Railway	4	283	3	203			1	80				
47	Northampton and Amherst	4	1,338	2	1,308			2	30				
49	Norton and Taunton	5	128	4	110	1	18						
51	Pittsfield Electric	9	160	3	120					6	40		
54	Norwood, Canton and Sharon	3	60	1	40	2	20						
55	Sheilburne Falls and Coleraine	2	135	2	135								
56	Southbridge and Sturbridge	1	70	1	70								
57	Hampshire Street Railway	1	33	1	32								
58	Springfield Street Railway	5	75							5	75		
59	Springfield and Eastern	6	580	5	620			1	60				
61	East Taunton Street Railway	1	40	1	40								
62	Bristol County	2	2,000	1	800			1	1,200				
63	Templeton Street Railway	2	70	2	70								
64	Martha's Vineyard	1	550					1	550				
66	Reading, Wakefield and Lynnfield	1	35					1	35				
67	Hampshire and Worcester	31	210	4	75					27	135		
68	Warren, Brookfield and Spencer	9	130			9	130						
69	Webster and Dudley	2	110	2	110								
70	Woronoco Street Railway	4	590	3	490					1	100		
72	Worcester Consolidated	14	2,268	4	249	7	169	3	1,850				
73	Worcester and Blackstone Valley	6	580	4	200	1	30	1	350				
74	Worcester and Southbridge	11	1,200	11	1,200								
75	Worcester and Webster	1	50	1	50								
MICHIGAN.													
	Total for state	94	19,719	22	4,054	9	848	58	14,287	1	400	4	130
4	Detroit United Railway	9	2,860	1	70			6	2,350	1	400	1	40
5	Detroit and Port Huron Shore Line	10	2,109	2	450			8	1,659				
6	Detroit, Ypsilanti, Ann Arbor and Jackson	2	256	2	256								
7	Escanaba Electric Railway	1	16					1	16				
8	Grand Rapids Railway	1	600	1	600								
9	Grand Rapids, Grand Haven and Muskegon	17	3,428	11	480	4	48	2	2,900				
10	Grand Rapids, Holland and Lake Michigan	13	1,290					10	1,200			3	90
11	Houghton County Street Railway	7	335			2	20	6	315				
12	Twin City General Electric	1	1,000					1	1,000				
13	Negaunee and Ishpeming	1	30			1	30						
14	Jackson and Suburban Traction	3	648	1	168			2	480				
15	Michigan Traction	11	1,637					11	1,637				
18	Marquette and Presque Isle	1	740			1	740						
20	Toledo and Monroe	8	2,370	1	40			7	2,330				
21	Muskegon Traction and Lighting	1	10			1	10						
22	Detroit, Plymouth and Northville	3	825	1	25			2	300				
24	Saginaw Valley Traction	5	2,065	2	1,965			3	100				

GENERAL TABLES.

387

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES—Continued.

Number.	STATE AND NAME OF COMPANY.	BRIDGES.												TUNNELS.	
		TOTAL.		Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.					
		Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.		
MINNESOTA.															
	Total for state	2	1,360			1	60	1	1,300						
2	Duluth-Superior Traction	1	60			1	60								
5	Winona Railway and Light	1	1,300					1	1,300						
MISSISSIPPI.															
	Total for state	8	322			1	20	7	302						
3	Meridian Light and Railway	5	160			1	20	4	140						
5	Vicksburg Railroad, Power and Manufacturing	3	162					3	162						
MISSOURI.															
	Total for state	93	20,918	35	13,135	4	432	50	6,491	3	60	1	800		
2	Carrollton Electric Railway	4	475			1	70	3	405						
4	Hannibal Railway and Electric	4	72			1	12			3	60				
5	Southwest Missouri Electric Railway	10	1,949	2	160			8	1,789						
6	Metropolitan	19	14,137	16	11,729	1	150	1	1,456			1	800		
7	Missouri Water, Light and Traction	1	20					1	20						
8	St. Joseph Railway, Light, Heat and Power	3	115	1	40			2	75						
9	St. Louis Transit	23	2,018	12	586			11	1,432						
10	St. Louis and Suburban	6	285	1	60			5	225						
11	St. Louis and Meramec River	3	600	1	300			2	100						
12	St. Louis and Kirkwood	10	320	2	60	1	200	7	260						
13	St. Louis, St. Charles and Western	8	700					8	700						
14	Railway and Electric of Sedalia	2	27					2	27						
MONTANA.															
	Total for state	7	615	2	150	1	50	4	415						
1	Anaconda Copper Mining	1	40					1	40						
3	Butte Electric Railway	5	325	2	150			3	375						
5	Helena Power and Light	1	50			1	50								
NEBRASKA.															
	Total for state	15	756			15	756								
1	Lincoln Traction	15	756			15	756								
NEW HAMPSHIRE.															
	Total for state	9	6,285	3	205	4	5,380	2	700						
3	Exeter, Hampton and Amesbury	4	5,405	1	75	3	5,330								
4	Keene Electric Railway	2	130	2	130										
6	Manchester Street Railway	1	50			1	50								
7	Portsmouth Electric Railway	2	700					2	700						
NEW JERSEY.															
	Total for state	88	25,940	34	6,973	22	2,842	25	16,066	7	119				
2	Bridgeton and Millville	7	203	6	82			1	121						
3	Brigantine Transportation	1	5,280					1	5,280						
4	Camden, Gloucester and Woodbury	3	2,267	1	117			2	2,150						
5	Camden and Suburban	5	310			4	286			1	12				
7	Elizabeth, Plainfield and Central Jersey	2	1,500			2	1,500								
8	New Jersey and Hudson River Railway and Ferry	9	2,537	7	1,927			2	610						
9	Jersey City, Hoboken and Paterson	5	1,150	3	150			2	1,000						
10	North Jersey Street Railway	4	3,615	2	1,500			2	2,115						
11	Jersey Central Traction	2	75			2	75								
12	Monmouth County Electric	4	950	2	50			2	900						
13	Atlantic Coast Electric Railroad	9	4,925	2	2,120	1	325	6	2,490						
14	Millville Traction	3	364	1	60	2	304								
18	Orange and Passaic Valley	3	60			3	60								
19	South Orange and Maplewood	1	12	1	12										
20	Raritan Traction	2	400			1	100	1	300						
23	Trenton Street Railway	5	510	4	310			1	200						
24	Camden and Trenton	23	1,782	5	645	7	180	5	850	6	107				
NEW YORK.															
	Total for state	410	43,795	203	22,285	88	2,872	111	15,396	6	442	2	2,800		
1	Albany and Hudson Railway and Power	20	2,996	14	2,914	6	82								
3	Hudson Valley Railway	38	2,296	22	1,134	13	639	3	525						
4	Troy and New England	15	450			10	400			5	50				
5	Amsterdam Street Railroad	4	236	3	176			1	60						
6	Auburn City Railway	2	110	2	110										
7	Auburn Interurban Electric	1	41	1	41										
8	Ballston Terminal Railroad	6	860	2	200	1	60	3	600						
9	Binghamton Railway	4	112	4	112										
10	International Railway	67	6,206	28	4,360	1	40	38	1,406						
11	Crosstown Street Railway	17	5,945	16	5,553					1	392				
12	Buffalo and Depew	3	1,177	2	252			1	925						
17	Cortland County Traction	8	470	7	370			1	100						
18	Corning and Painted Post	2	104	1	90	1	14								
21	Elmira Water, Light and Railroad	1	100					1	100						
24	Fonda, Johnstown and Gloversville	3	84	1	51			2	33						

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES—Continued.

Number.	STATE AND NAME OF COMPANY	TOTAL		BRIDGES.								TUNNELS.	
		Num-ber.	Length, feet.	Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.		Num-ber.	Length, feet.
				Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.		
NEW YORK—Continued.													
26	Geneva, Waterloo, etc., Traction	2	215	1	15			1	200				
27	Mountain Lake Electric	6	60			1	20	5	40				
28	Bennington and Hoosick Valley	8	359	7	319			1	40				
30	Hornellsville and Canisteo	3	178					3	178				
31	Huntington Railroad	1	30			1	30						
32	Ithaca Street Railway	9	620	4	585			5	35				
33	Jamestown Street Railway	11	298	11	296								
34	Kingston Consolidated	1	1,000								1	1,000	
36	Lima-Honeoye Light and Railroad	1	19			1	19						
37	Middletown-Goshen Electric	5	250	3	210	2	40						
38	New York and Long Island Traction	1	10			1	10						
39	Orange County Traction	15	2,415			13	250	2	2,165				
40	New Paltz and Poughkeepsie	10	869	2	757	8	112						
41	Interurban	1	1,800								1	1,800	
58	Brooklyn Rapid Transit	8	1,139	4	357	1	30	3	752				
61	New York and Queens County	1	60					1	60				
62	New York and North Shore	5	166	1	40	4	126						
64	Staten Island Electric	1	600	1	600								
65	Niagara Gorge Railroad	4	335	3	305	1	30						
68	Olean, Rock City and Bradford	5	900			1	300	4	600				
69	Olean Street Railway	2	110	2	110								
71	Oneonta, Cooperstown and Richfield Springs	8	144	3	74	5	70						
73	Oswego Traction	5	1,100	4	100	1	1,000						
75	Penn Yan, Keuka Park and Branchport	3	56			2	24	1	32				
77	New York and Stamford	1	25	1	25								
80	Rochester Railway	4	207	4	207								
82	Rochester andodus Bay	17	834					17	834				
83	Rochester, Charlotte and Manitou	6	2,400					6	2,400				
87	Southfield Beach Railroad	1	157			1	157						
88	Syracuse Rapid Transit	15	862	13	823	2	39						
89	Syracuse and Suburban	6	786	4	186			2	600				
90	Syracuse, Lakeside and Baldwinsville	6	1,819	3	319	1	30	2	1,470				
91	Utica and Mohawk Valley	24	1,190	18	1,100	6	90						
92	Black River Traction	6	780	3	80			3	700				
93	Elmira and Seneca Lake	10	516	9	404			1	112				
94	Buffalo, Gardenville and Ebenezzer	1	160			1	160						
95	Hamburg Railway	6	139	3	110			3	29				
NORTH CAROLINA.													
Total for state		9	433	1	100	8	333						
1	Asheville Electric	1	18			1	18						
2	Asheville Street Railroad	3	75			3	75						
4	Charlotte Railway, Light and Power	1	60			1	60						
7	Fries Manufacturing and Power	4	280	1	100	3	180						
OHIO.													
Total for state		394	42,650	200	17,894	43	1,278	130	22,818	20	630	1	30
2	Pennsylvania and Ohio	1	90	1	90								
3	Ohio Central Traction	9	33	7	23	2	10						
5	Stark Electric	4	392	2	142			2	250				
6	Canton-Akron	2	560	1	50			1	500				
10	Mill Creek Valley	1	80	1	80								
11	Cincinnati, Dayton and Toledo	28	2,352	14	290	9	162	5	1,900				
12	Cincinnati, Lawrenceburg and Aurora	5	1,220	4	500			1	720				
13	Cleveland Electric Railway	5	915	3	135	1	300	1	480				
15	Cleveland, Elyria and Western	4	380	3	850						1	30	
16	Eastern Ohio Traction	7	330	2	150	3	120	2	60				
17	Cleveland, Painesville and Eastern	3	2,700	2	2,400			1	300				
18	Northern Ohio Traction	15	2,330	8	1,180	4	90	3	1,060				
20	Columbus, London and Springfield	7	1,360	2	1,060			5	300				
21	Columbus, Buckeye Lake and Newark	20	2,170	4	170			16	2,000				
25	Dayton and Western	4	400	4	400								
26	Dayton and Northern	26	422	17	344					9	78		
27	Dayton, Springfield and Urbana	16	436	5	288			10	130	1	18		
28	Dayton and Troy	17	2,740	10	2,000			5	640	2	100		
29	Dayton and Xenia	6	1,500	3	500			3	1,000				
30	Peoples Gas and Electric	1	50			1	50						
33	East Liverpool Railway	6	1,180	3	830			2	300	1	50		
36	Western Ohio Railway	31	6,043	22	1,069			3	4,650	6	324		
37	Lorain Street Railway	2	18	1	10	1	8						
38	Mansfield Railway, Light and Power	7	1,140	1	65			6	1,075				
42	Tuscarawas Traction	3	225					3	225				
43	Ohio River Railway and Power	3	400					3	400				
47	Springfield and Xenia	6	388	4	338			2	50				
49	Steubenville Traction and Light	10	445	1	45			9	400				
51	Tiffin, Fostoria and Eastern	6	234	4	154	2	80						
53	Toledo, Bowling Green and Southern	5	200	4	140					1	60		
54	Toledo, Fostoria and Findlay	9	155	3	65	6	90						
55	Toledo and Western	24	1,063	13	535			11	528				
56	Lake Shore	55	6,081	27	1,798			28	4,285				
57	Toledo and Maumee Valley	3	330	2	300			1	30				
61	Youngstown-Sharon Railway and Light	36	2,763	22	2,395	14	368						
62	Mahoning Valley	7	1,535					7	1,535				
OREGON.													
Total for state		9	21,564			2	324	7	21,240				
1	Astoria Electric	1	5,500					1	5,500				
2	Portland Railway	2	9,200					2	9,200				
4	Portland City and Oregon	3	6,264			2	324	1	5,940				
5	Salem Light, Power and Traction	3	600					3	600				

GENERAL TABLES.

389

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES—Continued.

Number.	STATE AND NAME OF COMPANY.	BRIDGES.										TUNNELS.	
		TOTAL.		Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.			
		Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.
PENNSYLVANIA.													
	Total for state.....	352	34,564	146	17,483	100	3,481	53	11,272	44	1,693	9	635
1	Lehigh Valley Traction	8	1,500	8	1,500								
2	Philadelphia and Lehigh Valley	18	1,045	10	506	5	151	2	338	1	50		
3	Allentown and Kutztown Traction	20	715	9	303	10	252	1	160				
4	Altoona and Logan Valley	12	575	12	575								
9	Columbia and Montour	3	420			2	100	1	320				
10	Bradford Electric Street Railway	3	100					3	100				
12	Carlisle and Mt. Holly	5	140			1	70			4	70		
13	Cumberland Valley Traction	4	70			3	60			1	10		
14	Chester Traction	2	90	2	90								
15	Media, Middletown, Aston and Chester	7	535	1	125	5	110	1	300				
16	Philadelphia and Chester Railway	2	100	2	100								
17	Connellsville Suburban	1	50			1	50						
18	Newtown Electric Street Railway	3	300	2	200	1	100						
19	Doylestown and Easton	1	60	1	60								
20	Doylestown and Willow Grove	10	1,000							10	1,000		
22	Easton and Nazareth	9	719	1	25	5	70	2	564	1	60		
23	Erie Electric Motor	2	200			1	100	1	100				
24	Erie Traction	8	170	2	90								
25	Erie Rapid Transit	4	215	1	60	6	80					2	75
27	Gettysburg Transit	3	90	1	60			1	80				
29	Lehigh Traction	10	241	2	58	2	47	6	136	2	30		
30	Harrisburg Traction	9	170	2	100					7	70		
31	Harrisburg and Mechanicsburg	2	150	2	150								
32	Cambria Incline Plane	1	100	1	100								
33	Johnstown Passenger Railway	10	775	10	775								
34	Kittanning and Ford City	4	62	1	22			2	20	1	20		
35	Conestoga Traction	8	2,360	1	550	6	710	1	1,100				
36	Lebanon Valley	5	63			3	45			2	18		
37	Lewistown and Reedsville	3	210	2	198	1	12						
38	Susquehanna Traction	1	40	1	40								
39	Lykens and Williams Valley	1	120					1	120				
41	Schuylkill Traction	16	2,368	4	285	8	256	4	1,825				
42	Meadville Traction	2	240	2	240								
44	Lewisburg, Milton and Watsonstown	4	90	1	25	3	65						
45	Schuylkill Valley Traction	1	85	1	35								
46	Lansdale and Norristown	1	100	1	100								
49	Peoples Street Railway	3	90	3	90								
50	Citizens Traction	3	755	2	515			1	240				
51	Philadelphia and West Chester Traction	4	60	4	60								
53	Fairmount Park Transportation	15	2,922	6	2,322					3	100	6	500
54	Delaware County and Philadelphia	3	440	3	440								
60	Montgomery and Chester	2	350	1	50			1	300				
61	Pittsburg Railways	6	2,775	8	1,255			3	1,520				
67	Pittsburg, McKeesport and Greensburg	19	799	9	200	8	133	1	406			1	60
68	Pittsburg, McKeesport and Connellsville	16	2,770	4	970			12	1,800				
70	Ringling Rocks Electric	1	75					1	75				
71	Pottsville Union Traction	3	150			3	150						
72	Punxsutawney Street Railway	3	95			3	95						
73	United Traction	15	867	8	744	7	123						
74	Waverly, Sayre and Athens	3	400	3	400								
75	Neverink Mountain Railroad	3	288					3	288				
77	Scranton Railway	5	3,060	2	2,300	1	60	2	700				
78	Shamokin and Mt. Carmel	3	1,100	2	800	1	300						
79	Shamokin and Edgewood	1	10			1	10						
82	Tamaqua and Lansford	4	300	3	270	1	30						
84	Titusville Electric Traction	2	330			1	30	1	300				
85	Warren Street Railway	3	60			3	60						
87	West Chester Street Railway	2	530	1	130			1	400				
88	Wilkesbarre and Wyoming Valley	11	340	7	180					4	160		
89	Wilkesbarre, Dallas and Harveys Lake	9	217			7	187			2	30		
92	Williamsport Passenger Railway	1	265	1	265								
96	York and Dover Electric	1	120	1	120								
97	York and Dallastown Electric	7	155					1	80	6	75		
98	York Street Railway	1	23			1	23						
RHODE ISLAND.													
	Total for state	20	4,518	2	680	3	294	15	3,544				
1	Sea View Railroad	7	1,280					7	1,280				
2	Pawtucket Street Railway	1	460					1	460				
4	Rhode Island Suburban	11	2,766	2	680	8	294	6	1,792				
7	Pawcatuck Valley Railway	1	12					1	12				
SOUTH CAROLINA.													
	Total for state	12	3,600	2	180	2	450	8	7,970				
2	Charleston Railway, Gas and Electric	5	7,480	2	180			3	7,300				
3	Columbia Railway, Light and Power	2	70					2	70				
4	Greenville Traction	1	350			1	350						
6	Rock Hill Water, Light and Railway	1	100			1	100						
7	Spartanburg Railway, Gas and Electric	3	600					3	600				
TENNESSEE.													
	Total for state	81	4,631	6	2,435	12	475	25	1,446	38	275		
2	Chattanooga Electric Railway	7	205	1	65	1	125			5	15		
3	Rapid Transit of Chattanooga	51	850	1	400			20	250	30	200		
4	Electric Railway of Clarksville	1	6					1	6				
6	Knoxville Traction	1	200					1	200				
7	Memphis Street Railway	16	1,480	1	120	11	350	1	950	3	60		
8	Nashville Railway	5	1,880	3	1,850			2	40				

SUPPLEMENTARY TABLE 1.—BRIDGES AND TUNNELS OWNED BY STREET RAILWAY COMPANIES—Continued.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		BRIDGES.								TUNNELS.	
				Iron and steel.		Wooden.		Wooden trestles or trestle bridges.		Masonry.			
		Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.	Num-ber.	Length, feet.
TEXAS.													
Total for state		64	6,113	3	380	9	1,078	50	4,565	2	90		
2	Bonham Electric Railway, Light and Power	2	30					2	30				
4	Rapid Transit	6	190			4	100	1	30	1	60		
5	Denison and Sherman	11	550					11	550				
6	El Paso Electric Railway	10	1,058			5	978	5	80				
7	Northern Texas Traction	19	1,780	3	380			16	1,400				
8	Galveston Street Railway	5	1,400					5	1,400				
9	Houston Electric	1	200					1	200				
12	Paris Transit	1	30							1	30		
13	San Antonio Traction	8	800					8	800				
15	Citizens Railway	1	75					1	75				
UTAH.													
Total for state		10	295	1	150	9	145						
1	Ogden Rapid Transit	6	210	1	150	5	60						
2	Consolidated Railway and Power	2	25			2	25						
3	Salt Lake and Utah Valley	2	60			2	60						
VERMONT.													
Total for state		18	2,514	7	1,282	7	87	4	1,165				
1	Barre and Montpelier	3	222	2	190	1	32						
2	Bellows Falls and Saxtons River	3	265	2	256	1	9						
6	St. Albans Street Railway	3	450					3	450				
7	Springfield Electric Railway	3	836	3	836								
8	Mt. Mansfield Electric Railway	6	761			5	46	1	715				
VIRGINIA.													
Total for state		81	32,549	15	4,826	9	2,796	55	24,918	2	9		
1	Charlottesville City and Suburban	3	516			1	86	2	430				
3	Washington, Arlington and Falls Church	3	43			2	38			1	5		
5	Citizens Railway, Light and Power	1	1,640					1	1,640				
6	Newport News and Old Point Railway and Electric	3	2,000					3	2,000				
7	Bay Shore Terminal	3	3,761					3	3,761				
8	Norfolk and Atlantic Terminal	10	4,981	2	226			8	4,755				
9	Berkley Street Railway	6	6,600	1	1,300	1	1,500	4	3,800				
10	Norfolk Railway and Light	4	1,810	1	110	1	1,000	2	700				
12	Richmond and Petersburg Electric	19	2,984	4	560	1	42	14	2,382				
13	Old Dominion Railway	5	270			2	70	3	200				
14	Norfolk, Portsmouth and Newport News	1	500					1	500				
18	Virginia Passenger and Power	8	3,283	4	2,510			4	773				
19	Roanoke Railway and Electric	4	212	2	105			2	107				
21	Washington, Alexandria and Mt. Vernon	11	3,949	1	15	1	60	8	3,870	1	4		
WASHINGTON.													
Total for state		52	39,954			9	1,966	43	37,988				
1	Everett Railway and Electric	1	150					1	150				
2	Olympia Light and Power	3	320					3	320				
3	Seattle Electric	26	33,177			3	257	23	32,920				
4	Seattle and Renton	3	625					3	625				
5	Washington Water Power	1	25			1	25						
7	Tacoma Railway and Power	11	3,673					11	3,673				
8	Northern Railway and Improvement	7	1,984			5	1,684	2	300				
WEST VIRGINIA.													
Total for state		23	11,225	7	1,190	5	375	11	9,660				
4	Camden Interstate Railway	8	3,540	2	600	2	300	4	2,640				
5	Parkersburg, Marietta and Interurban	9	4,455	1	40	3	75	5	4,340				
7	Wheeling Traction	2	2,700	1	100			1	2,600				
8	Wheeling and Elm Grove	4	530	3	450			1	80				
WISCONSIN.													
Total for state		20	6,706	6	4,243	5	515	9	1,948				
1	Wisconsin Traction, Light, Heat and Power	1	800	1	800								
2	Ashland Light, Power and Street Railway	2	300			2	300						
3	Chippewa Valley Electric Railroad	2	12					2	12				
5	Fox River Electric Railway and Power	1	200					1	200				
7	La Crosse City Railway	1	170					1	170				
9	Madison Traction	1	75			1	75						
10	Manitowoc and Northern	2	1,200	1	200			1	1,000				
11	Marinette Gas, Electric Light and Street Railway	1	16					1	16				
14	Milwaukee Light, Heat and Traction	6	3,383	4	3,243	2	140						
15	Winnebago Traction	3	550					3	550				
HAWAII.													
Total for territory		9	298	1	90	5	184			3	24		
2	Honolulu Rapid Transit and Land	8	238	1	90	4	124			3	24		
3	Pacific Heights Electric Railway	1	60			1	60						
PORTO RICO.													
Total		2	518	2	518								
2	San Juan Light and Transit	2	518	2	518								

GENERAL TABLES.

391

SUPPLEMENTARY TABLE 2.—FEEDER CONDUIT SYSTEM, LENGTH IN MILES.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		CONCRETE.		TERRA COTTA AND VITRIFIED CLAY.		IRON PIPE.		WOODEN DUCT, ETC.	
		Street occupied.	Duct.	Street occupied.	Duct.	Street occupied.	Duct.	Street occupied.	Duct.	Street occupied.	Duct.
	UNITED STATES.....	589.3	6,546.9	13.5	95.3	336.6	3,905.1	156.0	1,981.4	83.2	565.1
	DISTRICT OF COLUMBIA.										
	Total for district.....	28.9	195.5			14.1	77.5	14.8	118.0		
3	Capital Traction.....	9.7	74.1			3.5	28.0	6.2	51.1		
4	City and Suburban of Washington.....	8.6	66.9					8.6	66.9		
7	Metropolitan Railroad.....	10.6	54.5			10.6	54.5				
	GEORGIA.										
	Total for state.....	8.3	41.3			7.0	40.0	1.3	1.3		
2	Georgia Railway and Electric.....	8.3	41.3			7.0	40.0	1.3	1.3		
	ILLINOIS.										
	Total for state.....	32.6	145.8	2.1	19.9	30.1	121.3	.4	4.6		
9	Chicago City Railway.....	6.6	68.8	2.1	19.9	4.1	44.3	.4	4.6		
10	Chicago Union Traction.....	26.0	77.0			26.0	77.0				
	MASSACHUSETTS.										
	Total for state.....	33.0	318.5			26.4	233.8	6.5	84.6	.1	.1
4	Old Colony Street Railway.....	.5	3.3			.5	3.3				
6	Boston Elevated Railway.....	22.8	227.5			16.3	142.9	6.5	84.6		
38	Union Street Railway.....	1.5	15.0			1.5	15.0				
51	Pittsfield Electric.....	.1	.1							.1	.1
58	Springfield Street Railway.....	8.1	72.6			8.1	72.6				
	MICHIGAN.										
	Total for state.....	.1	.1	.1	.1						
2	Bay Cities Consolidated.....	.1	.1	.1	.1						
	MINNESOTA.										
	Total for state.....	14.0	27.5			.5	2.5	13.5	25.0		
3	Twin City Rapid Transit.....	14.0	27.5			.5	2.5	13.5	25.0		
	MISSOURI.										
	Total for state.....	1.3	18.8	.8	18.3			.5	.5		
9	St. Louis Transit.....	1.3	18.8	.8	18.3			.5	.5		
	NEW JERSEY.										
	Total for state.....	3.7	76.0			3.6	75.4	.1	.6		
8	New Jersey and Hudson River Railway and Ferry.....	.2	.6			.2	.6				
10	North Jersey Street Railway.....	3.5	75.4			3.4	74.8	.1	.6		
	NEW YORK.										
	Total for state.....	145.8	3,317.1	10.5	57.0	96.2	2,294.2	32.2	943.4	6.9	22.5
10	International Railway.....	17.2	105.1	10.5	57.0	2.8	28.9			3.9	19.2
41	Interurban.....	95.0	2,778.9			60.0	1,836.2	32.0	939.4	3.0	3.3
49	Kingsbridge Railway.....	3.1	13.0			3.1	13.0				
55	Manhattan Railway (elevated).....	12.9	279.0			12.7	275.0	.2	4.0		
58	Brooklyn Rapid Transit.....	10.0	133.5			10.0	133.5				
80	Rochester Railway.....	7.6	7.6			7.6	7.6				
	OHIO.										
	Total for state.....	6.0	46.5			.5	9.5	5.5	37.0		
62	Toledo Railways and Light.....	6.0	46.5			.5	9.5	5.5	37.0		
	PENNSYLVANIA.										
	Total for state.....	204.8	1,685.8			47.4	376.9	81.2	766.4	76.2	542.5
53	Union Traction.....	200.8	1,681.8			47.4	376.9	81.2	766.4	72.2	538.5
58	Fairmount Park Transportation.....	4.0	4.0							4.0	4.0
	WISCONSIN.										
	Total for state.....	110.8	674.0			110.8	674.0				
13	Milwaukee Electric Railway and Light.....	108.0	636.0			108.0	636.0				
14	Milwaukee Light, Heat and Traction.....	2.8	38.0			2.8	38.0				

SUPPLEMENTARY TABLE 3.—WATER WHEELS AND GAS ENGINES.

Number.	STATE AND NAME OF COMPANY.	WATER WHEELS.								GAS ENGINE.	
		Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and under 2,000 H. P.			
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
	UNITED STATES	159	49,153	129	22,453	12	6,850	18	19,850	15	1,925
	CALIFORNIA.										
	Total for state	8	6,495	3	245			5	6,250	3	175
7	Los Angeles and Pasadena	1	45	1	45						
15	Ontario and San Antonio Heights	2	200	2	200						
16	Pasadena and Mt. Lowe									2	100
22	Sacramento Electric, Gas and Railway	5	6,250					5	6,250		
80	San Jose and Santa Clara									1	75
	COLORADO.										
	Total for state	1	250	1	250						
2	Colorado Springs and Cripple Creek	1	250	1	250						
	CONNECTICUT.										
	Total for state	3	646	3	646						
19	Peoples Tramway	3	646	3	646						
	FLORIDA.										
	Total for state	8	1,400	8	1,400						
6	Tampa Electric	8	1,400	8	1,400						
	GEORGIA.										
	Total for state	17	5,470	13	3,070	4	2,400				
1	Athens Electric Railway	4	1,050	4	1,050						
3	Augusta Railway and Electric	7	3,220	3	820	4	2,400				
4	Columbus Railroad	6	1,200	6	1,200						
	IDAHO.										
	Total for state	1	60	1	60						
1	Boise Rapid Transit	1	60	1	60						
	ILLINOIS.										
	Total for state	2	550	2	550					5	400
10	Chicago Union Traction									5	400
42	Ottawa Railway, Light and Power	2	550	2	550						
	MAINE.										
	Total for state	23	3,325	23	3,325						
2	Public Works	15	2,000	15	2,000						
16	Sanford and Cape Porpoise	1	75	1	75						
19	Waterville and Fairfield Railway and Light	7	1,250	7	1,250						
	MASSACHUSETTS.										
	Total for state	13	1,732	13	1,732						
21	Greenfield and Turners Falls	4	440	4	440						
55	Shelburne Falls and Coleraine	1	250	1	250						
59	Springfield and Eastern	2	450	2	450						
72	Worcester Consolidated	6	592	6	592						
	MINNESOTA.										
	Total for state	12	10,280	2	280			10	10,000		
3	Twin City Rapid Transit	12	10,280	2	280			10	10,000		
	MONTANA.										
	Total for state	1	250	1	250						
1	Anaconda Copper Mining	1	250	1	250						
	NEW YORK.										
	Total for state	21	8,645	17	4,395	1	650	3	3,600	2	100
1	Albany and Hudson Railway and Power	8	5,300	5	1,700			3	3,600		
3	Hudson Valley Railway	4	1,300	4	1,300						
14	Ontario Light and Traction	2	275	2	275						
31	Huntington Railroad									2	100
32	Ithaca Street Railway	2	800	2	800						
67	Ogdensburg Street Railway	4	320	4	320						
89	Syracuse and Suburban	1	650			1	650				

GENERAL TABLES.

393

SUPPLEMENTARY TABLE 3.—WATER WHEELS AND GAS ENGINES—Continued.

Number.	STATE AND NAME OF COMPANY.	WATER WHEELS.								GAS ENGINEER.	
		Total.		500 H. P. or under.		Over 500 H. P. and under 1,000 H. P.		1,000 H. P. and under 2,000 H. P.			
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
NORTH CAROLINA.											
	Total for state	22	2,950	22	2,950						
1	Asheville Electric	6	950	6	950						
7	Fries Manufacturing and Power	16	2,000	16	2,000						
OHIO.											
	Total for state	1	600			1	600			2	250
34	Lancaster Traction									2	250
57	Toledo and Maumee Valley	1	600			1	600				
PENNSYLVANIA.											
	Total for state	2	200	2	200					3	1,000
42	Mauch Chunk, Lehigh and Slatington	2	200	2	200						
51	Citizens Traction									1	400
65	Warren Street Railway									2	600
VERMONT.											
	Total for state	2	140	2	140						
3	Brattleboro Street Railway	2	140	2	140						
VIRGINIA.											
	Total for state	5	950	5	950						
4	Lynchburg Traction and Light	2	350	2	350						
15	Radford Water Power	3	600	3	600						
WASHINGTON.											
	Total for state	5	1,325	5	1,325						
2	Olympia Light and Power	5	1,325	5	1,325						
WISCONSIN.											
	Total for state	12	3,885	6	685	6	3,200				
1	Wisconsin Traction, Light, Heat and Power	6	3,200			6	3,200				
12	Merrill Railway and Lighting	5	475	5	475						
17	Waupaca Electric Light and Railway	1	210	1	210						

SUPPLEMENTARY TABLE 4.—ALTERNATING-CURRENT DYNAMOS.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		500 H. P. OR UNDER.		OVER 500 H. P. AND UNDER 1,000 H. P.		1,000 H. P. AND UNDER 2,000 H. P.		2,000 H. P. AND OVER.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
	UNITED STATES.....	441	231,924	329	61,935	54	36,418	36	39,696	22	93,875
	ALABAMA.										
	Total for state.....	11	1,737	11	1,737						
2	Birmingham Railway, Light and Power.....	4	712	4	712						
4	Alabama City, Gadsden and Attalla.....	1	75	1	75						
5	Huntsville Railway, Light and Power.....	2	140	2	140						
6	Mobile Light and Railroad.....	4	810	4	810						
	ARKANSAS.										
	Total for state.....	3	466	3	466						
6	Citizens Light and Transit.....	3	466	3	466						
	CALIFORNIA.										
	Total for state.....	6	5,090	1	90			5	5,000		
15	Ontario and San Antonio Heights.....	1	90	1	90						
22	Sacramento Electric, Gas and Railway.....	5	5,000					5	5,000		
	COLORADO.										
	Total for state.....	6	1,691	5	1,024	1	667				
1	Boulder Railway and Utility.....	2	185	2	185						
2	Colorado Springs and Cripple Creek.....	1	306	1	306						
8	Pueblo Traction and Lighting.....	3	1,200	2	533	1	667				

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 4.—ALTERNATING-CURRENT DYNAMOS—Continued.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		500 H. P. OR UNDER.		OVER 500 H. P. AND UNDER 1,000 H. P.		1,000 H. P. AND UNDER 2,000 H. P.		2,000 H. P. AND OVER.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
CONNECTICUT.											
	Total for state	16	3,160	15	2,620	1	540				
1	Branford Lighting and Water	2	300	2	300						
2	Connecticut Railway and Lighting	13	2,320	13	2,320						
19	Peoples Tramway	1	540			1	540				
FLORIDA.											
	Total for state	11	2,313	11	2,313						
2	Jacksonville Electric	2	400	2	400						
3	Key West Electric	5	413	5	413						
6	Tampa Electric	4	1,500	4	1,500						
GEORGIA.											
	Total for state	20	7,643	15	2,963	3	2,000	2	2,680		
1	Athens Electric Railway	1	335	1	335						
2	Georgia Railway and Electric	3	3,480			1	800	2	2,680		
3	Augusta Railway and Electric	2	1,200			2	1,200				
4	Columbus Railroad	7	1,055	7	1,055						
6	Macon Railway and Light	3	560	3	560						
7	City Electric Railway	2	213	2	213						
8	Savannah Electric	2	800	2	800						
ILLINOIS.											
	Total for state	11	2,750	11	2,750						
6	Egypt Electric	2	150	2	150						
12	Calumet Electric Street Railway	1	150	1	150						
21	Chicago and Milwaukee	2	750	2	750						
25	Danville Railway and Light	3	1,100	3	1,100						
42	Ottawa Railway, Light and Power	2	400	2	400						
45	Peoria and Pekin Terminal	1	200	1	200						
INDIANA.											
	Total for state	13	8,955	8	1,255	1	700	1	1,000	3	6,000
5	Fort Wayne and Southwestern	1	1,000					1	1,000		
9	Indianapolis, Shelbyville and Southeastern	1	700			1	700				
11	Union Traction	3	6,000							3	6,000
18	Madison Light and Railway	2	230	2	230						
23	Indiana Railway	1	125	1	125						
24	Terre Haute Electric	5	900	5	900						
IOWA.											
	Total for state	20	3,379	20	3,379						
1	Boone Electric	2	175	2	175						
2	Burlington Railway and Light	2	300	2	300						
10	Union Electric	3	666	3	666						
11	Fort Dodge Light and Power	2	200	2	200						
14	Keokuk Railway and Power	3	500	3	500						
15	Marshalltown Light, Power and Railway	3	540	3	540						
18	Ottumwa Traction and Light	2	600	2	600						
21	Tama and Toledo	2	123	2	123						
22	Waterloo and Cedar Falls	1	275	1	275						
KANSAS.											
	Total for state	3	560	3	560						
8	Pittsburg Railroad	1	160	1	160						
11	Wichita Railroad and Light	2	400	2	400						
KENTUCKY.											
	Total for state	10	1,473	10	1,473						
5	Lexington Railway	5	773	5	773						
12	Paducah City Railway	5	700	5	700						
LOUISIANA.											
	Total for state	1	73	1	73						
1	Baton Rouge Electric and Gas	1	73	1	73						
MAINE.											
	Total for state	10	3,083	10	3,083						
2	Public Works	2	1,000	2	1,000						
11	Lewiston, Brunswick and Bath	3	1,000	3	1,000						
15	Rockland, Thomaston and Camden	1	250	1	250						
19	Waterville and Fairfield Railway and Light	4	833	4	833						
MARYLAND.											
	Total for state	2	240	2	240						
6	Hagerstown Railway	2	240	2	240						
MASSACHUSETTS.											
	Total for state	11	2,914	9	1,714	2	1,200				
4	Old Colony Street Railway	3	247	3	247						
5	Boston and Northern	2	667	2	667						
25	Holyoke Street Railway	1	100	1	100						
35	Milford and Uxbridge	2	300	2	300						
53	Brockton and Plymouth	1	400	1	400						
74	Worcester and Southbridge	2	1,200			2	1,200				

GENERAL TABLES.

395

SUPPLEMENTARY TABLE 4.—ALTERNATING-CURRENT DYNAMOS—Continued.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		500 H. P. OR UNDER.		OVER 500 H. P. AND UNDER 1,000 H. P.		1,000 H. P. AND UNDER 2,000 H. P.		2,000 H. P. AND OVER.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
MICHIGAN.											
Total for state.....		39	11,662	31	6,595	8	5,067				
3	Benton Harbor and St. Joseph.....	3	400	3	400						
4	Detroit United Railway.....	1	333	1	333						
5	Detroit and Port Huron Shore Line.....	3	2,000			3	2,000				
6	Detroit, Ypsilanti, Ann Arbor and Jackson.....	5	1,250	5	1,250						
9	Grand Rapids, Grand Haven and Muskegon.....	5	1,675	5	1,675						
10	Grand Rapids, Holland and Lake Michigan.....	2	1,333			2	1,333				
11	Houghton County Street Railway.....	1	667			1	667				
12	Twin City General Electric.....	5	320	5	320						
13	Negaunee and Ishpeming.....	2	335	2	335						
19	Menominee Light, Railway and Power.....	2	150	2	150						
20	Toledo and Monroe.....	2	1,067			2	1,067				
21	Muskegon Traction and Lighting.....	3	800	3	800						
23	Owosso and Corunna Electric.....	2	126	2	126						
24	Saginaw Valley Traction.....	3	1,206	3	1,206						
MINNESOTA.											
Total for state.....		9	8,100	1	100			8	8,000		
3	Twin City Rapid Transit.....	8	8,000					8	8,000		
5	Winona Railway and Light.....	1	100	1	100						
MISSISSIPPI.											
Total for state.....		9	1,556	9	1,556						
2	Jackson Railway, Light and Power.....	3	573	3	573						
3	Meridian Light and Railway.....	2	533	2	533						
5	Vicksburg Railroad, Power and Manufacturing.....	4	450	4	450						
MISSOURI.											
Total for state.....		11	7,683	5	667	3	2,200	3	4,816		
5	Southwest Missouri Electric Railway.....	1	900			1	900				
7	Missouri Water, Light and Traction.....	1	167	1	167						
8	St. Joseph Railway, Light, Heat and Power.....	3	1,500	1	200	2	1,300				
9	St. Louis Transit.....	2	3,216					2	3,216		
10	St. Louis and Suburban.....	1	1,600					1	1,600		
14	Railway and Electric of Sedalia.....	3	300	3	300						
NEBRASKA.											
Total for state.....		2	250	2	250						
1	Lincoln Traction.....	2	250	2	250						
NEW HAMPSHIRE.											
Total for state.....		2	900	1	200	1	700				
3	Exeter, Hampton and Amesbury.....	2	900	1	200	1	700				
NEW JERSEY.											
Total for state.....		2	388	2	388						
21	Point Pleasant Traction, Electric Light and Power.....	2	388	2	388						
NEW YORK.											
Total for state.....		46	88,693	28	5,818			3	3,000	15	79,875
1	Albany and Hudson Railway and Power.....	6	3,900	3	900			3	3,000		
14	Ontario Light and Traction.....	1	135	1	135						
17	Cortland County Traction.....	2	320	2	320						
19	Dunkirk and Fredonia.....	2	120	2	120						
21	Elmira Water, Light and Railroad.....	4	1,066	4	1,066						
32	Ithaca Street Railway.....	2	400	2	400						
36	Lima-Honeoye Light and Railroad.....	2	200	2	200						
41	Interurban.....	11	53,075							11	53,075
55	Manhattan Railway (elevated).....	4	26,800							4	26,800
74	Peekskill Lighting and Railroad.....	3	500	3	500						
78	Port Jervis Electric, Gas and Railroad.....	2	193	2	193						
82	Rochester and Sodus Bay.....	2	800	2	800						
85	Schenectady Railway.....	5	1,184	5	1,184						
NORTH CAROLINA.											
Total for state.....		11	4,036	9	2,036			2	2,000		
1	Asheville Electric.....	2	530	2	530						
4	Charlotte Railway, Light and Power.....	4	480	4	480						
5	Raleigh Electric.....	1	426	1	426						
7	Fries Manufacturing and Power.....	4	2,600	2	600			2	2,000		
OHIO.											
Total for state.....		50	23,314	28	6,160	17	11,654	5	5,500		
4	Consolidated.....	2	380	2	380						
5	Stark Electric.....	2	1,543			2	1,543				
6	Canton-Akron.....	3	2,400			2	1,200	1	1,200		
7	Chillicothe Electric Railroad, Light and Power.....	2	320	2	320						
16	Eastern Ohio Traction.....	1	415	1	415						
18	Northern Ohio Traction.....	3	786	2	120	1	666				
20	Columbus, London and Springfield.....	2	1,600			2	1,600				
21	Columbus, Buckeye Lake and Newark.....	2	2,300					2	2,300		

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 4.—ALTERNATING-CURRENT DYNAMOS—Continued.

Number.	STATE AND NAME OF COMPANY.	TOTAL.		500 H. P. OR UNDER.		OVER 500 H. P. AND UNDER 1,000 H. P.		1,000 H. P. AND UNDER 2,000 H. P.		2,000 H. P. AND OVER.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
OHIO—Continued.											
26	Dayton and Northern	2	666	2	666						
30	Peoples Gas and Electric	1	200	1	200						
32	United Electric	4	198	4	198						
36	Western Ohio Railway	4	3,120			2	1,120	2	2,000		
38	Mansfield Railway, Light and Power	3	1,629	1	294	2	1,335				
42	Tuscarawas Traction	1	120	1	120						
44	Portsmouth Street Railway	2	300	2	300						
47	Springfield and Xenia	2	800	2	800						
52	Toledo Railways and Light	3	1,067	3	1,067						
53	Toledo, Bowling Green and Southern	3	720	3	720						
55	Toledo and Western	3	1,920	1	480	2	1,440				
56	Lake Shore	4	2,750			4	2,750				
58	Wellston and Jackson Belt	1	80	1	80						
OREGON.											
	Total for state	4	1,000	3	400	1	600				
3	City and Suburban	1	600			1	600				
5	Salem Light, Power and Traction	3	400	3	400						
PENNSYLVANIA.											
	Total for state	13	6,443	8	1,443			5	5,000		
9	Columbia and Montour	2	533	2	533						
18	Newtown Electric Street Railway	2	250	2	250						
35	Conestoga Traction	1	400	1	400						
61	Pittsburg Railways	5	5,000					5	5,000		
66	Washington Electric Railway	3	260	3	260						
SOUTH CAROLINA.											
	Total for state	8	1,590	8	1,590						
2	Charleston Railway, Gas and Electric	6	1,270	6	1,270						
7	Spartanburg Railway, Gas and Electric	2	320	2	320						
TENNESSEE.											
	Total for state	3	1,183	1	117	2	1,066				
5	Jackson and Suburban	1	117	1	117						
6	Knoxville Traction	2	1,066			2	1,066				
TEXAS.											
	Total for state	4	2,173	2	433	2	1,740				
7	Northern Texas Traction	2	1,740			2	1,740				
8	Galveston Street Railway	2	433	2	433						
VIRGINIA.											
	Total for state	17	3,555	16	2,721	1	834				
4	Lynchburg Traction and Light	5	775	5	775						
5	Citizens Railway, Light and Power	1	50	1	50						
6	Newport News and Old Point Railway and Electric	5	1,900	4	1,066	1	834				
10	Norfolk Railway and Light	3	500	3	500						
15	Radford Water Power	2	280	2	280						
19	Roanoke Railway and Electric	1	50	1	50						
WASHINGTON.											
	Total for state	13	5,252	9	1,168	2	1,384	2	2,700		
1	Everett Railway and Electric	1	634			1	634				
2	Olympia Light and Power	3	348	3	348						
3	Seattle Electric	5	660	5	660						
7	Tacoma Railway and Power	3	3,450			1	750	2	2,700		
8	Northern Railway and Improvement	1	160	1	160						
WEST VIRGINIA.											
	Total for state	14	3,923	11	2,123	3	1,800				
3	Fairmont and Clarksburg	4	653	4	653						
4	Camden Interstate Railway	3	1,800			3	1,800				
5	Parkersburg, Marietta and Interurban	5	1,260	5	1,260						
8	Wheeling and Elm Grove	2	210	2	210						
WISCONSIN.											
	Total for state	30	14,696	20	2,430	6	4,266			4	8,000
1	Wisconsin Traction, Light, Heat and Power	2	1,600			2	1,600				
2	Ashland Light, Power and Street Railway	3	320	3	320						
4	Fond du Lac Street Railway and Light	3	350	3	350						
11	Marquette Gas, Electric Light and Street Railway	3	350	3	350						
13	Milwaukee Electric Railway and Light	10	10,720	3	720	3	2,000			4	8,000
14	Milwaukee Light, Heat and Traction	2	706	1	40	1	666				
15	Winnebago Traction	1	300	1	300						
16	Sheboygan Light, Power and Railway	5	250	5	250						
17	Waupaca Electric Light and Railway	1	100	1	100						
HAWAII.											
	Total	1	75	1	75						
3	Pacific Heights Electric Railway	1	75	1	75						
PORTO RICO.											
	Total	2	600	2	600						
2	San Juan Light and Transit	2	600	2	600						

GENERAL TABLES.

397

SUPPLEMENTARY TABLE 5.—AUXILIARY ELECTRIC EQUIPMENT.

Number.	STATE AND NAME OF COMPANY.	TRANSFORMERS.		STORAGE-BATTERY CELLS.		BOOSTERS.		AUXILIARY GENERATORS.		ROTARIES.		ELECTRIC MOTORS USED IN PLANT OR SUBSTATION FOR MISCELLANEOUS WORK.			
												Direct current.		Alternating current.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
	UNITED STATES.	1731	63,486	16,471	19,744	104	18,319	471	5,044	83	27,861	432	10,053	86	5,101
	ALABAMA.														
	Total for state	3	187.									3	240		
1	Anniston Electric and Gas											3	240		
6	Mobile Light and Railroad	3	187												
	ARKANSAS.														
	Total for state	3	180												
6	Citizens Light and Transit	3	180												
	CALIFORNIA.														
	Total for state	12	4,240	1,012	561	4	170	3	55			6	320	5	1,105
4	Nevada County Traction			270	15							2	70		
7	Los Angeles and Pasadena					1	75								
8	Los Angeles Pacific Railway							1	25						
15	Ontario and San Antonio Heights			250	180	1	15					1	20	1	5
20	Redlands Street Railway													3	900
22	Sacramento Electric, Gas and Railway	12	4,240			1	60					1	200	1	200
23	San Bernardino Valley														
24	San Diego Electric Railway			225	190										
28	United Railroads of San Francisco							2	30						
30	San Jose and Santa Clara			267	176	1	20					2	30		
	COLORADO.														
	Total for state	8	614	264	235	1	87	3	49	2	533	2	45		
2	Colorado Springs and Cripple Creek	6	600							2	533				
3	Colorado Springs Rapid Transit											2	45		
8	Pueblo Traction and Lighting	2	14	264	235	1	87	3	49						
	CONNECTICUT.														
	Total for state	6	800	1,270	1,072	4	620			1	200				
2	Connecticut Railway and Lighting			264	(¹)	2	320								
9	Hartford, Manchester and Rockville			264	200										
10	New York, New Haven and Hartford (Berlin system)			472	472										
15	Fairhaven and Westville					1	250								
17	Montville Street Railway			270	400	1	50								
19	Peoples Tramway	6	800							1	200				
	DELAWARE.														
	Total for state											6	996	1	63
1	Wilmington and New Castle											1	63	1	63
2	Peoples Railway											3	400		
3	Wilmington City											2	533		
	DISTRICT OF COLUMBIA.														
	Total for district			264	150	3	400	4	182						
3	Capital Traction					3	400	1	67						
5	Columbia Railway			264	150			1	25						
7	Metropolitan Railroad							2	90						
	GEORGIA.														
	Total for state	8	1,967							1	500	4	95	2	80
2	Georgia Railway and Electric	2	500							1	500	4	95	2	80
3	Augusta Railway and Electric	4	1,200												
4	Columbus Railroad	2	267												
	ILLINOIS.														
	Total for state	4	154	1,033	1,648	6	1,303			1	35	22	707	2	8
2	Elgin, Aurora and Southern					1	200								
9	Chicago City Railway			250	1,000	1	533								
10	Chicago Union Traction											10	275		
11	Chicago Consolidated Traction					1	275					3	262		
12	Calumet Electric Street Railway	3	150												
13	Chicago Electric Traction					1	175								
18	South Side Elevated Railroad			520	433										
20	South Chicago City Railway					2	120					5	150		
21	Chicago and Milwaukee			263	215							2	5		
22	Lake Street Elevated Railroad													2	8
40	Coal Belt Electric Railway									1	35				
44	Central Railway											2	15		
45	Peoria and Pekin Terminal	1	4												

¹ Exclusive of 9 for which horsepower was not reported.² Exclusive of 1,966 for which horsepower was not reported.³ Exclusive of 3 for which horsepower was not reported.⁴ Exclusive of 1 for which horsepower was not reported.⁵ Not reported.

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 5.—AUXILIARY ELECTRIC EQUIPMENT—Continued.

Number.	STATE AND NAME OF COMPANY.	TRANSFORMERS.		STORAGE-BATTERY CELLS.		BOOSTERS.		AUXILIARY GENERATORS.		ROTARIES.		ELECTRIC MOTORS USED IN PLANT OR SUBSTATION FOR MISCELLANEOUS WORK.			
												Direct current.		Alternating current.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
	INDIANA.														
	Total for state.....	20	5,200	264	256	1	320	2	150	6	1,688	6	153		
3	Evansville Electric Railway.....	1	75							1	100	1	20		
5	Fort Wayne and Southwestern.....														
7	Indianapolis Street Railway.....					1	320					2	95		
9	Indianapolis, Shelbyville and Southeastern.....	3	(1)							1	463				
11	Union Traction.....	15	5,700	264	256			2	150	3	1,000				
22	Richmond Street and Interurban.....	1	125							1	125				
23	Indiana Railway.....											3	38		
	IOWA.														
	Total for state.....	12	1,057	215	100			5	63	1	450	1	15	2	6
3	Cedar Rapids and Marion City.....											1	15		
8	Des Moines City Railway.....													2	6
9	Interurban Railway.....	3	450							1	450				
10	Union Electric.....							3	50						
15	Marshalltown Light, Power and Railway.....	1	5												
17	Citizens Railway and Light.....							2	13						
18	Ottumwa Traction and Light.....	3	300												
21	Tama and Toledo.....	2	2												
22	Waterloo and Cedar Falls.....	3	300	215	100										
	KANSAS.														
	Total for state.....	4	225												
11	Wichita Railroad and Light.....	4	225												
	KENTUCKY.														
	Total for state.....											5	87		
7	Louisville Railway.....											4	75		
12	Paducah City Railway.....											1	12		
	LOUISIANA.														
	Total for state.....					1	117								
5	New Orleans Railways.....					1	117								
	MAINE.														
	Total for state.....	406	2,500	524	500	5	514					2	21	1	1
2	Public Works.....					4	354							1	1
6	Biddeford and Saco.....			264	200										
11	Lewiston, Brunswick and Bath.....	6	1,000									1	20		
13	Portland Railroad.....					1	160								
14	Portsmouth, Kittery and York.....											1	1		
19	Waterville and Fairfield Railway and Light.....	400	1,500	260	300										
	MARYLAND.														
	Total for state.....			260	230	5	1,033								
1	United Railways.....			260	230	5	1,033								
	MASSACHUSETTS.														
	Total for state.....	32	2,655	1,913	1,112	11	1,368	3	20	8	1,083	47	1,025		
1	Amherst and Sunderland.....			216	180										
3	Lexington and Boston.....			432	100										
4	Old Colony Street Railway.....					2	400	2	8						
5	Boston and Northern.....	15	640			2	153	1	12	4	400	5	9		
6	Boston Elevated Railway.....									2	133	40	1,000		
10	Hoosac Valley.....					1	75								
14	Norfolk Western Railway.....											1	3		
21	Greenfield and Turners Falls.....			200	100										
25	Holyoke Street Railway.....	4	140			1	120								
31	Marlboro and Westboro.....											1	13		
35	Milford and Uxbridge.....	3	225			1	200			1	225				
44	Newton and Boston.....			263	200										
53	Brockton and Plymouth.....	7	1,050							1	325				
59	Springfield and Eastern.....					2	250								
68	Warren, Brookfield and Spencer.....					1	90								
70	Worococo Street Railway.....			266	100										
72	Worcester Consolidated.....			536	432	1	80								
74	Worcester and Southbridge.....	3	600												
	MICHIGAN.														
	Total for state.....	41	14,777	802	(1)	5	875	9	1,004	10	3,533	6	70	16	140
4	Detroit United Railway.....	4	1,600												
5	Detroit and Port Huron Shore Line.....	7	3,733	802	(1)	2	500	2	500	2	533			12	60
6	Detroit, Ypsilanti, Ann Arbor and Jackson.....	4	2,200			3	375	2	100						
7	Escanaba Electric Railway.....							1	100						
9	Grand Rapids, Grand Haven and Muskegon.....	4	2,010									1	5	4	80
10	Grand Rapids, Holland and Lake Michigan.....	7	1,867							2	800	2	45		
11	Houghton County Street Railway.....	6	667							1	333				
13	Negaunee and Ishpeming.....							2	250						
15	Michigan Traction.....	9	2,700							3	1,200				
17	Manistee, Filer City and Eastlake.....											1	2		
19	Menominee Light, Railway and Power.....											1	3		
20	Toledo and Monroe.....									2	667	1	15		
24	Saginaw Valley Traction.....							2	54						

¹ Not reported.

GENERAL TABLES.

399

SUPPLEMENTARY TABLE 5.—AUXILIARY ELECTRIC EQUIPMENT—Continued.

Number.	STATE AND NAME OF COMPANY.	TRANSFORMERS.		STORAGE-BATTERY CELLS.		BOOSTERS.		AUXILIARY GENERATORS.		ROTARIES.		ELECTRIC MOTORS USED IN PLANT OR SUBSTATION FOR MISCELLANEOUS WORK.			
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	Direct current.		Alternating current.	
												No.	H. P.	No.	H. P.
MINNESOTA.															
	Total for state.....	12	4,000	576	3,000										
3	Twin City Rapid Transit.....	12	4,000	576	3,000										
MISSOURI.															
	Total for state.....	14	3,690			3	685	6	195	3	2,400	25	831	2	125
6	Metropolitan.....											2	150		
8	St. Joseph Railway, Light, Heat and Power.....	4	600			1	25	2	30						
9	St. Louis Transit.....	1	80			2	660	4	165			22	666	2	125
10	St. Louis and Suburban.....	6	2,000							2	1,600				
12	St. Louis and Kirkwood.....	3	1,000							1	800				
14	Railway and Electric of Sedalia.....											1	15		
NEW HAMPSHIRE.															
	Total for state.....	6	750	250	53	1	100	1	335	2	400	4	7	5	8
1	Concord Street Railway.....							1	335						
3	Exeter, Hampton and Amesbury.....	6	750							2	400	3	6	5	8
5	Laconia Street Railway.....			250	53										
7	Portsmouth Electric Railway.....					1	100					1	1		
NEW JERSEY.															
	Total for state.....			350	288	5	389	1	120			6	57		
1	West Jersey and Seashore.....					1	160								
5	Camden and Suburban.....					1	13					2	10		
8	New Jersey and Hudson River Railway and Ferry.....			350	288										
10	North Jersey Street Railway.....											1	7		
13	Atlantic Coast Electric Railroad.....							1	120			3	40		
16	Middlesex and Somerset.....					2	166								
23	Trenton Street Railway.....					1	50								
NEW YORK.															
	Total for state.....	39	6,281	1,564	3,261	12	3,310	16	1,950	7	3,978	190	3,459	27	2,521
1	Albany and Hudson Railway and Power.....	3	1,000					2	150			6	6	1	1
3	Hudson Valley Railway.....			276	231										
9	Binghamton Railway.....	3	440							1	400				
10	International Railway.....											2	50		
14	Ontario Light and Traction.....					1	50								
31	Huntington Railroad.....			250	70										
32	Ithaca Street Railway.....							4	250						
41	Interurban.....							6	1,235			166	2,823	6	1,890
55	Manhattan Railway (elevated).....	16	3,839	50	200			3	265	2	2,140				
58	Brooklyn Rapid Transit.....			496	2,250	5	2,260					9	440	13	550
59	Coney Island and Brooklyn.....					1	500					4	100		
61	New York and Queens County.....					1	(1)								
68	Olean, Rock City and Bradford.....					2	300								
71	Oneonta, Cooperstown and Richfield Springs.....					1	150								
73	Oswego Traction.....											1	15		
74	Peekskill Lighting and Railroad.....			264	110										
80	Rochester Railway.....			228	400			1	50						
82	Rochester andodus Bay.....	6	135							1	350				
85	Schenectady Railway.....	11	867							3	1,068			7	80
89	Syracuse and Suburban.....											1	15		
92	Black River Traction.....					1	50					1	10		
NORTH CAROLINA.															
	Total for state.....	3	300									1	5	1	5
1	Asheville Electric.....	3	300											1	5
4	Charlotte Railway, Light and Power.....											1	5		
OHIO.															
	Total for state.....	73	9,317	2,292	2,392	12	1,162	3	81	15	5,704	28	834	5	9
2	Pennsylvania and Ohio.....	6	800							2	667	2	7		
5	Stark Electric.....	4	402					2	81	2	669				
6	Canton-Akron.....	6	800	250	180					2	800			4	4
8	Cincinnati Traction.....											10	400		
10	Mill Creek Valley.....											2	40		
11	Cincinnati, Dayton and Toledo.....			290	160							2	17		
13	Cleveland Electric Railway.....			276	1,280										
14	Cleveland City Railway.....											3	50		
16	Eastern Ohio Traction.....	6	(1)	900	(1)	2	(1)	1	(1)						
17	Cleveland, Painesville and Eastern.....											1	15		
20	Columbus, London and Springfield.....	6	2,400												
21	Columbus, Buckeye Lake and Newark.....	12	1,600							4	1,800				
24	Oakwood Street.....											1	5		
25	Dayton and Western.....					1	100								
26	Dayton and Northern.....	2	315	312	300					2	315				
27	Dayton, Springfield and Urbana.....					1	150								
28	Dayton and Troy.....					2	135					1	250		
36	Western Ohio Railway.....	4	2,000							2	1,120				
38	Mansfield Railway, Light and Power.....					1	120								
47	Springfield and Xenia.....	3	400									1	5		
52	Toledo Railways and Light.....					2	333			1	533				
53	Toledo, Bowling Green and Southern.....					1	24								
54	Toledo, Fostoria and Findlay.....					1	100					1	5		
56	Toledo and Western.....													1	5
57	Lake Shore.....	27	200									4	40		
57	Toledo and Maumee Valley.....					1	200								
62	Mahoning Valley.....			264	472										

1 Not reported.

SUPPLEMENTARY TABLE 5.—AUXILIARY ELECTRIC EQUIPMENT—Continued.

Number.	STATE AND NAME OF COMPANY.	TRANSFORMERS.		STORAGE-BATTERY CELLS.		BOOSTERS.		AUXILIARY GENERATORS.		ROTARIES.		ELECTRIC MOTORS USED IN PLANT OR SUBSTATION FOR MISCELLANEOUS WORK.			
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.	Direct current.		Alternating current.	
												No.	H. P.	No.	H. P.
OREGON.															
	Total for state.....											1	125		
2	Portland Railway.....											1	125		
PENNSYLVANIA.															
	Total for state.....	8	879	4,035	3,820	19	4,663	5	124	15	4,063	35	485		
1	Lehigh Valley Traction.....			264	93	1	60								
3	Allentown and Kutztown Traction.....			245	267										
4	Altoona and Logan Valley.....			264	250			1	14						
9	Columbia and Montour.....	3	150												
14	Chester Traction.....					1	185					1	5		
30	Harrisburg Traction.....											2	35		
35	Conestoga Traction.....	2	400							1	330	3	3		
43	Meadville Traction.....											1	5		
48	Schuylkill Valley Traction.....					2	230					1	15		
50	Peoples Street Railway.....											1	5		
56	Union Traction.....			270	300	8	2,105	2	50			22	342		
58	Fairmount Park Transportation.....											1	10		
59	Delaware County and Philadelphia.....	1	4												
61	Pittsburg Railways.....			2,750	2,660	2	1,400			14	3,733				
68	Pittsburg, McKeesport and Connellsville.....					1	150								
73	United Traction.....					1	180								
77	Seranton Railway.....					1	133					1	30		
78	Shamokin and Mt. Carmel.....					1	160								
84	Titusville Electric Traction.....											1	5		
88	Wilkesbarre and Wyoming Valley.....					1	60	2	60			1	30		
89	Wilkesbarre, Dallas and Harveys Lake.....	2	325												
94	Red Lion and Windsor.....			242	250										
RHODE ISLAND.															
	Total for state.....			485	600	3	292								
1	Sea View Railroad.....					1	92								
3	Union Railroad.....					2	200								
6	New York, New Haven and Hartford.....			485	600										
SOUTH CAROLINA.															
	Total for state.....	4	150			1	250							2	450
2	Charleston Railway, Gas and Electric.....	4	150			1	250								
3	Columbia Railway, Light and Power.....													2	450
TENNESSEE.															
	Total for state.....					1	115					4	60		
3	Rapid Transit of Chattanooga.....											2	30		
7	Memphis Street Railway.....					1	115					2	30		
TEXAS.															
	Total for state.....	7	1,400					2	40	2	660	1	3		
7	Northern Texas Traction.....	7	1,400					2	40	2	660				
12	Paris Transit.....											1	3		
VERMONT.															
	Total for state.....			216	100							1	2		
1	Barre and Montpelier.....											1	2		
6	St. Albans Street Railway.....			216	100										
VIRGINIA.															
	Total for state.....	4	1,133			2	200	2	27						
1	Charlottesville City and Suburban.....							2	27						
6	Newport News and Old Point Railway and Electric.....	3	1,000												
10	Norfolk Railway and Light.....					1	75								
12	Richmond and Petersburg Electric.....					1	125								
15	Radford Water Power.....	1	133												
WASHINGTON.															
	Total for state.....	2	400					5	149	3	1,634	6	91		
1	Everett Railway and Electric.....	2	400							1	334				
2	Olympia Light and Power.....							2	66						
3	Seattle Electric.....											5	76		
7	Tacoma Railway and Power.....							3	88	2	1,300				
8	Northern Railway and Improvement.....											1	15		
WEST VIRGINIA.															
	Total for state.....									6	1,000				
4	Camden Interstate Railway.....									6	1,000				
WISCONSIN.															
	Total for state.....	6	640	848	366	2	346	2	500			20	320	15	560
3	Chippewa Valley Electric Railroad.....							1	300						
6	Janesville Street Railway.....											1	6		
12	Merrill Railway and Lighting.....			240	40										
13	Milwaukee Electric Railway and Light.....	6	640	608	326	2	346	1	200			19	314	15	560

GENERAL TABLES.

401

SUPPLEMENTARY TABLE 6.—SUBSTATION EQUIPMENT.

Number.	STATE AND NAME OF COMPANY.	ROTARY CONVERTERS, ETC.		TRANSFORMERS.		STORAGE-BATTERY CELLS.		MISCELLANEOUS.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
	UNITED STATES.....	1 358	186,688	2 926	221,459	2 20,960	39,249	4 40	6,235
	ALABAMA.								
	Total for state			4	375				
2	Birmingham Railway, Light and Power			4	375				
	CALIFORNIA.								
	Total for state	4	1,277	42	9,206				
7	Los Angeles and Pasadena.....	1	75						
20	Redlands Street Railway	1	135	3	160				
22	Sacramento Electric, Gas and Railway			33	7,600				
28	United Railroads of San Francisco	2	1,067	6	1,446				
	CONNECTICUT.								
	Total for state	1	200	3	225				
19	Peoples Tramway	1	200	3	225				
	DISTRICT OF COLUMBIA.								
	Total for district	5	1,400	10	1,400	508	133		
2	Brightwood Railway	3	600	6	600	264	80		
4	City and Suburban of Washington	2	800	4	800	244	53		
	FLORIDA.								
	Total for state			4	800			2	530
6	Tampa Electric			4	800			2	530
	GEORGIA.								
	Total for state	3	1,600	3	2,000	150	910		
2	Georgia Railway and Electric	3	1,600	3	2,000	150	910		
	ILLINOIS.								
	Total for state	12	5,617	28	8,113	1,566	556	3	(²)
21	Chicago and Milwaukee	4	700	12	2,413	504	200		
22	Lake Street Elevated Railroad	2	2,667	6	3,000				
23	Chicago and Joliet	6	2,250	10	2,700	864	256	3	(⁴)
25	Danville Railway and Light					198	100		
	INDIANA.								
	Total for state	19	6,088	50	7,125	2,112	1,250		
5	Fort Wayne and Southwestern	2	500	2	(⁵)				
9	Indianapolis, Shelbyville and Southeastern	1	463	3	(⁶)				
11	Union Traction	15	5,000	44	7,000	2,112	1,250		
22	Richmond Street and Interurban	1	125	1	125				
	IOWA.								
	Total for state	2	650	6	750				
9	Interurban Railway	1	450	3	450				
22	Waterloo and Cedar Falls	1	200	3	300				
	MAINE.								
	Total for state	6	608	23	2,280	976	810		
2	Public Works			9	960				
3	Penobscot Central Railway					450	400		
11	Lewiston, Brunswick and Bath	4	250	9	1,000				
14	Portsmouth, Kittery and York					220	180		
16	Sanford and Cape Porpoise	1	225	3	300	276	230		
19	Waterville and Fairfield Railway and Light	1	133	2	20				
	MARYLAND.								
	Total for state					258	90		
9	Washington and Rockville					258	90		
	MASSACHUSETTS.								
	Total for state	16	2,577	48	2,967	980	330		
5	Boston and Northern	8	800	24	962				
6	Boston Elevated Railway					270	35		
14	Norfolk Western Railway	2	202	6	240	260	175		
35	Milford and Uxbridge	1	225	3	225	450	120		
58	Brockton and Plymouth	2	600	6	640				
74	Worcester and Southbridge	3	750	9	900				

¹ Exclusive of 8 for which horsepower was not reported.² Exclusive of 14 for which horsepower was not reported.³ Exclusive of 1,080 for which horsepower was not reported.⁴ Exclusive of 3 for which horsepower was not reported.⁵ Not reported.

STREET AND ELECTRIC RAILWAYS.

SUPPLEMENTARY TABLE 6.—SUBSTATION EQUIPMENT—Continued.

Number.	STATE AND NAME OF COMPANY.	ROTARY CONVERTERS, ETC.		TRANSFORMERS.		STORAGE-BATTERY CELLS.		MISCELLANEOUS.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
MICHIGAN.									
	Total for state	40	11,870	79	16,399	552	(1)		
4	Detroit United Railway	3	1,000	8	1,066	552	(1)		
5	Detroit and Port Huron Shore Line	12	3,200	21	4,200				
6	Detroit, Ypsilanti, Ann Arbor and Jackson	12	3,000	18	5,400				
9	Grand Rapids, Grand Haven and Muskegon	2	670	3	1,246				
10	Grand Rapids, Holland and Lake Michigan	4	1,600	14	1,120				
11	Houghton County Street Railway	2	667	6	667				
15	Michigan Traction	3	1,200	9	2,700				
20	Toledo and Monroe	2	533						
MINNESOTA.									
	Total for state	8	6,800	24	6,800				
3	Twin City Rapid Transit	8	6,800	24	6,800				
MISSOURI.									
	Total for state	10	6,165	35	7,697	55	30		
5	Southwest Missouri Electric Railway	4	1,333	12	1,280				
9	St. Louis Transit	4	3,232	16	4,415	55	30		
10	St. Louis and Suburban	2	1,600	6	2,000				
14	Railway and Electric of Sedalia			1	2				
MONTANA.									
	Total for state	2	250						
5	Helena Power and Light	2	250						
NEW HAMPSHIRE.									
	Total for state	8	3,600	24	2,900	264	1,200		
3	Exeter, Hampton and Amesbury	8	3,600	24	2,900				
7	Portsmouth Electric Railway					264	1,200		
NEW JERSEY.									
	Total for state	4	800	8	640	1,332	816		
2	Bridgeton and Millville	4	800	8	640	264	308		
5	Camden and Suburban					504	308		
16	Middlesex and Somerset					300	200		
23	Trenton Street Railway					264	(1)		
NEW YORK.									
	Total for state	107	105,998	322	116,332	4,569	25,102	28	4,700
1	Albany and Hudson Railway and Power	6	2,100	30	3,900				
2	United Traction	9	4,500	27	5,400				
3	Hudson Valley Railway					264	115		
9	Binghamton Railway	2	400	6	480			1	200
10	International Railway	20	10,000	48	8,000	840	4,820	10	100
17	Cortland County Traction	1		1	10				
38	New York and Long Island Traction	1	268	3	402	270	97		
41	Interurban	37	46,230	102	45,000	2,498	18,000	16	4,000
55	Manhattan Railway (elevated)	13	26,130	68	32,640	220	1,100		
58	Brooklyn Rapid Transit	13	14,070	39	20,100	248	750	1	400
82	Rochester andodus Bay	2	700	3	400				
85	Schenectady Railway	4	1,600						
92	Black River Traction					234	220		
NORTH CAROLINA.									
	Total for state	1	400	14	2,580				
1	Asheville Electric	1	400	3	880				
7	Fries Manufacturing and Power			11	1,700				
OHIO.									
	Total for state	65	15,088	102	12,983	1,128	2,221		
2	Pennsylvania and Ohio	1	330	3	400				
6	Canton-Akron	3	1,500	9	4,500				
11	Cincinnati, Dayton and Toledo	1	267	3	600				
16	Eastern Ohio Traction	6	(1)	3	(1)				
20	Columbus, London and Springfield	11	400						
21	Columbus, Buckeye Lake and Newark	2	800	6	800				
36	Western Ohio Railway	10	2,800	15	2,000				
47	Springfield and Xenia	2	800	6	800	300	250		
49	Steubenville Traction and Light					252	1,664		
56	Toledo and Western	7	3,060	21	2,100				
56	Lake Shore	14	3,800	27	200				
60	Youngstown Park and Falls	2	533	2	533				
61	Youngstown-Sharon Railway and Light	6	798	7	1,050	576	307		
PENNSYLVANIA.									
	Total for state	21	4,690	34	4,875	4,548	3,689		
9	Columbia and Montour	1	167	3	150				
18	Newtown Electric Street Railway	2	200						
30	Harrisburg Traction					264	354		
35	Conestoga Traction	1	330	2	400				
53	Union Traction					1,270	655		
56	Philadelphia and West Chester Traction	2	(1)	6	(1)	264	(1)		
61	Pittsburg Railways	14	3,733	21	4,000	2,750	2,680		
89	Wilkesbarre, Dallas and Harveys Lake	1	260	2	325				

¹ Not reported.

GENERAL TABLES.

403

SUPPLEMENTARY TABLE G.—SUBSTATION EQUIPMENT—Continued.

Number.	STATE AND NAME OF COMPANY	ROTARY CONVERTERS, ETC.		TRANSFORMERS.		STORAGE-BATTERY CELLS.		MISCELLANEOUS.	
		No.	H. P.	No.	H. P.	No.	H. P.	No.	H. P.
RHODE ISLAND.									
	Total for state	4	1,466	8	1,866	1,432	765		
1	Sea View Railroad.....					248	50		
3	Union Railroad.....					280	245		
4	Rhode Island Suburban	4	1,466	8	1,866	528	200		
5	Providence and Danielson					396	270		
SOUTH CAROLINA.									
	Total for state	2	533	6	600			4	472
3	Columbia Railway, Light and Power.....	2	533	6	600			4	472
TEXAS.									
	Total for state	4	1,900	12	2,000				
7	Northern Texas Traction	4	1,900	12	2,000				
VERMONT.									
	Total for state	1	210			306	320		
1	Barre and Montpelier.....	1	210			248	150		
2	Bellows Falls and Saxtons River					260	170		
VIRGINIA.									
	Total for state			8	1,200				
5	Citizens Railway, Light and Power.....			8	1,200				
WASHINGTON.									
	Total for state	5	3,333	10	4,000			5	333
3	Seattle Electric	5	3,333	10	4,000			5	333
WEST VIRGINIA.									
	Total for state	12	1,168	20	2,456	818	827		
4	Camden Interstate Railway	12	1,168	20	2,456	530	760		
5	Parkersburg, Marietta and Interurban					288	67		
WISCONSIN.									
	Total for state	4	2,400	13	2,890	264	200	1	200
3	Chippewa Valley Electric Railroad.....	1	200	3	150	264	200	1	200
13	Milwaukee Electric Railway and Light	2	2,000	5	2,000				
14	Milwaukee Light, Heat and Traction			2	500				
15	Winnebago Traction.....	1	200	3	240				

APPENDICES

APPENDIX A.—SCHEDULE

APPENDIX B.—INSTRUCTIONS TO SPECIAL AGENTS

APPENDIX A.

STREET RAILWAYS.

Name of company
 State City.....
 General offices at.....

UNITED STATES CENSUS OFFICE,
 Washington, D. C., October 15, 1902.

By section 7 of the act of Congress for the establishment of a permanent Census Office, passed March 6, 1902, the Director of the Census is required to prepare a report on the street railways of the United States, and the following schedule has been formulated for that purpose.

Mr. Thomas Commerford Martin, of New York city, expert special agent, is in charge of the electrical branch of this inquiry.

The system of accounting used in this schedule follows the form devised by the Street Railway Accountants' Association of America.

The information returned on this schedule should cover the business year of the establishment most nearly conforming to the year ending June 30, 1902. All questions that require a fixed time, such as mileage or track, cash on hand, etc., should be of the date of the last day of the year covered by the report.

WILLIAM R. MERRIAM,
 Director of the Census.

Extract from act of Congress, March 3, 1899:

SECTION 22. * * * "And every president, treasurer, secretary, director, agent, or other officer of every corporation, and every establishment of productive industry, whether conducted as a corporate body, limited liability company, or by private individuals, from which answers to any of the schedules, inquiries, or statistical interrogatories provided for by this act are herein required, who shall, if thereto requested by the Director, supervisor, enumerator, or special agent, willfully neglect or refuse to give true and complete answers to any inquiries authorized by this act, or shall willfully give false information, shall be guilty of a misdemeanor, and upon conviction thereof shall be fined not exceeding ten thousand dollars, to which may be added imprisonment for a period not exceeding one year."

CERTIFICATE.

This is to certify that the information contained in this schedule is complete and correct to the best of my knowledge and belief, and it covers the period from....., 190..., to....., 190...

(Signature and official designation of the person furnishing the information.)

(Signature of special agent.)

1. Date of charter under which organized.....
2. If a consolidated company, give names of constituent companies and dates of consolidation.....
3. If a controlling company, give names of constituent companies and dates such control began.....
4. If a reorganized company, give name of original company and date of reorganization.....
5. If a subsidiary or leased company, give name and address of controlling company or lessor and date such control began or date of lease.....
6. Kind of motive power used (electric, cable, animal, etc.).....
7. If there have been changes in the power employed, give date and character of the change.....
8. Is electric current generated for sale for light or power?.....
9. Give name of city or cities in which the road is operated, and if in rural districts, name the towns and counties.....
10. Total length of streets or roads or private right of way over which cars are run (in miles).....
11. If track extends into more than one state, give the number of single track miles in each state.....
12. Character and length of line (in single track miles):
 Single trolley overhead.....; double trolley overhead.....;
 conduit trolley.....; third rail.....; accumulator system.....;
 cable.....; steam.....; animal.....
13. Length of track owned by other companies upon which cars of this company are run either by agreement or contract (in single track miles).....
14. Is the municipal franchise limited in time; and, if so, for how long a time is it granted?.....

15. ACCIDENTS.

	TOTAL.	
	Killed.	Injured.
Passengers		
Employees		
Other persons		
Total		

16. TRAFFIC, MILEAGE, AND MISCELLANEOUS STATISTICS.

	Number.
Fare passengers carried.....	
Transfer passengers carried.....	
Total passengers carried.....	
Passenger-car mileage.....	
Freight, mail, express, and other car mileage.....	
Total car mileage.....	
Passenger-car hours.....	
Freight, mail, express, and other car hours.....	
Total car hours.....	
Transfer points.....	
Maximum speed, miles per hour, as per ordinance, within city limits.....	
outside city limits.....	
Rate of fare per passenger.....	
Are tickets sold; if so, at what rate to the passenger?.....	
Are mails carried for the Government?.....	
	Number.
Miles of exclusive telephone line in use for operation of road.....	
Stations.....	
Power houses.....	
Car houses.....	
Horses owned.....	
Lamps used in lighting buildings, shops, car houses, etc., and ways: Arc lamps.....	
Incandescent lamps.....	
State whether the company owns and operates any parks or pleasure resorts; if so, how many and cost of investment; if hired, annual rental. Number of visitors annually.....	
Miles of new road constructed and opened for operation during year.....	
Steam railroad crossings protected (number).....	
Steam railroad crossings unprotected (number).....	

STREET AND ELECTRIC RAILWAYS.

17. TRACK.

	Owned.	Leased.	Operated under trackage rights.	Total operated.
Length of road (first main track) ¹				
Length of second main track				
Total length of main track				
Length of sidings and turn-outs				
Total computed as single track				

¹ Length to be stated in miles and decimals of a mile carried to three places.

Miles of track on private right of way owned by road

Miles of track on private right of way not owned by road

How many miles of single track are within city or municipal ordinance limits?..

18. ELECTRIC LINE CONSTRUCTION.

	LENGTH OF LINE IN MILES AND FEET.			
	Span-wire construction.	Side-bracket construction.	Center pole.	Poles to mile.
1. Single overhead trolley				
2. Double overhead trolley				
3. Miles of line with iron and steel poles				
4. Miles of line with wooden poles				
5. Miles of track with cast welded joints				

19. CARS, ETC.

	Total number.	With electric equipment.	Without electric equipment.
Closed passenger cars			
Open passenger cars			
Combination cars (open and closed)			
Combination cars (passenger and freight or express)			
Total passenger cars			
Mall cars			
Express and freight cars			
Work cars			
Snow plows			
Sweepers			
Miscellaneous			
Total			

20. FENDERS AND BRAKES.

Total number of cars.	Equipped with fenders.	Equipped with hand brakes.	Equipped with air brakes.	Equipped with electric brakes.	Equipped with track brakes.	Equipped with friction brakes.	Equipped with more than one kind of brake.

21. HEATING OF CARS.

	Number.
Cars with electric heaters	
Cars heated by stoves	
Cars heated by hot water	
Cars heated by other systems	

22. LIGHTING OF CARS.

	Number.
Cars lighted by electricity	
Cars lighted by gas	
Cars lighted by oil	

23. WEIGHT OF RAILS.

Weight of rails per yard:

 Steel, maximum.....pounds.

 Steel, minimum.....pounds.

Name style (girder, tee, center groove, full groove, etc.):

24. CONDUIT SYSTEMS FOR DISTRIBUTION.

	Miles of street occupied.	Total miles of duct.
Concrete		
Terra cotta and vitrified clay		
Iron pipe, plain or lined with cement		
Wooden duct, etc.		

25. BRIDGES BUILT FOR ROAD.

	Number.	Aggregate length (feet).
Iron or steel bridges		
Wooden bridges		
Wooden trestles or trestle bridges		
Masonry viaducts		
Tunnels for cars		
Total		

26. POWER PLANT EQUIPMENT.

GENERATING POWER PLANT.	Number.	Total capacity in horse-power.
1. Steam engines:		
Under 500 H. P.		
Over 500 H. P. and under 1,000 H. P.		
Over 1,000 H. P. and under 2,000 H. P.		
2,000 H. P. and over		
2. Water wheels:		
Under 500 H. P.		
Over 500 H. P. and under 1,000 H. P.		
Over 1,000 H. P. and under 2,000 H. P.		
2,000 H. P. and over		
3. Gas engines		
4. Boilers		
5. Auxiliary engines for use within plant as accessories, etc		

27. ELECTRICAL GENERATORS.

	Number.	Total capacity in horse-power.	Voltage.
1. Direct current:			
Dynamoes—Under 500 H. P.			
Over 500 H. P. and under 1,000 H. P.			
Over 1,000 H. P. and under 2,000 H. P.			
2,000 H. P. and over			
2. Alternating current:			
Dynamoes..... phase—			
Under 500 H. P.			
Over 500 H. P. and under 1,000 H. P.			
Over 1,000 H. P. and under 2,000 H. P.			
2,000 H. P. and over			
3. Transformers			
4. Storage battery, cells			
5. Boosters for outside feeders			
6. Auxiliary generators for use within plant			
7. Rotaries			

28. SUBSTATION EQUIPMENT.

	Number.	Total capacity in horse-power.	Voltage.
1. Rotary converters, etc.			
2. Transformers			
3. Storage battery, cells			
Miscellaneous			
Electric motors used in plant or substation for miscellaneous work:			
1. Direct current			
2. Alternating			

29. MAINS AND FEEDERS.

Miles of overhead feeder construction	
Miles of underground feeder construction	

30. OUTPUT OF STATION.

Kilowatt hour, average per day	
Kilowatt hour, total for year	
Horsepower of current, average per day	
Horsepower of current, total for year	

31. CONSTRUCTION AND EQUIPMENT.

	Cost during the year.	Cost to date.
1. Organization	\$.....	\$.....
2. Engineering and superintendence		
3. Right of way		
4. Track and roadway construction		
5. Electric line construction		
6. Real estate used in operation of road		
7. Buildings and fixtures used in operation of road		
8. Investment real estate		
9. Power plant equipment		
10. Shop tools and machinery		
11. Cars		
12. Electric equipment of cars		
13. Miscellaneous equipment		
14. Interest and discount		
15. Miscellaneous		
Total		
Electric light or power service	\$.....	\$.....
Cost of road and equipment per mile of road owned		\$.....

STREET AND ELECTRIC RAILWAYS.

REMARKS.

32. OPERATING EXPENSES.

Maintenance:

Ways and structures—

1. Maintenance of track and roadway
2. Maintenance of electric, cable, etc., lines
3. Maintenance of buildings and fixtures

Total

Equipment—

4. Maintenance of steam plant
5. Maintenance of electric, cable, etc., plant
6. Maintenance of cars
7. Maintenance of electric, cable, etc., equipment of cars
8. Maintenance of miscellaneous equipment
9. Miscellaneous shop expenses

Total

Transportation:

Operation of power plant—

10. Power plant wages
11. Fuel for power
12. Water for power
13. Lubricants and wastes for power plant
14. Miscellaneous supplies and expenses of power plant
15. Hired power

Total

Operation of cars—

16. Superintendence of transportation
17. Wages of conductors
18. Wages of motormen
19. Wages of other car service employees
20. Wages of car house employees
21. Car service supplies
22. Miscellaneous car service expenses
23. Cleaning and sanding track
24. Removal of snow and ice

Total

General—

25. Salaries of general officers
26. Salaries of clerks
27. Printing and stationery
28. Miscellaneous office expenses
29. Storeroom expenses
30. Stable expenses
31. Advertising and attractions
32. Miscellaneous general expenses
33. Damages
34. Legal expenses in connection with damages
35. Other legal expenses
36. Rent of land and buildings
37. Rent of track and terminals
38. Insurance

Total

Grand total

Wages, supplies, and expenses, incidental and electric service not included in any other of the above items¹

¹ For roads that sell light or power.

33. INCOME ACCOUNT.

INCOME.

Passengers	\$
Chartered cars .....	.....
Freight .....	.....
Mail .....	.....
Express .....	.....
Sale of electric current for light or power .....	.....
Miscellaneous .....	.....
Total .....	.....

EXPENSES.

Total operating expenses	\$
Taxes:	
Real and personal property	\$
Capital stock .....	.....
Earnings .....	.....
Miscellaneous (specifying same) .....	.....
Interest:	
Funded debt .....	.....
Real estate mortgages .....	.....
Floating debt .....	.....
Rent of leased lines and terminals .....	.....
Miscellaneous .....	.....
Total .....	.....

Net income

34. BALANCE SHEET.

ASSETS.		LIABILITIES.	
Kind.	Amount.	Kind.	Amount.
Cost of construction and real estate	\$	Capital stock	\$
Cost of equipment		Funded debt .....	.....
Other permanent investments		Bills payable .....	.....
Cash on hand		Interest due .....	.....
Bills receivable		Dividends due .....	.....
Supplies		Sundries .....	.....
Sundries			
Total		Total .....	.....

35. CAPITAL STOCK.

	COMMON.		PREFERRED.		DIVIDENDS DURING YEAR.	
	Number of shares.	Total par value.	Number of shares.	Total par value.	Rate.	Amount.
Authorized						
Issued						
Total number of stockholders,						

36. FUNDED DEBT.

Amount authorized	\$
Amount outstanding	\$
Rates of interest,	per cent.

APPENDIX.

411

37. EMPLOYEES' SALARIES, WAGES, ETC.

	Average number employed during the year.	Total amount paid in wages and salaries during the year.
General officers.....		\$
Other officers (managers, superintendents, etc.).....		
Clerks.....		
Foremen.....		
Inspectors.....		
Conductors.....		
Motormen.....		
Starters.....		
Watchmen.....		
Switchmen.....		
Road and track men.....		
Hostlers, stablemen, etc.....		
Linemen.....		
Engineers.....		
Dynamo and switchboard men.....		
Electricians.....		
Firemen.....		
Mechanics.....		
Lamp trimmers.....		
Other employees.....		
Total.....		

38. NUMBER OF EMPLOYEES AT SPECIFIED DAILY RATES OF PAY.

[illegible]

1

2

APPENDIX B.

INSTRUCTIONS TO SPECIAL AGENTS.

Reports must be secured on Special Schedule No. 1 (Form 8-120) for all street railways that were in existence during any portion of the year ending June 30, 1902. Roads operated in rural as well as urban districts must be reported.

The schedule is prepared primarily for roads operated by electricity, as the greatest number and most important street railways have adopted this form of motive power. In cases where the road was operated in whole or in part by cable, animal, steam, or motive power other than electricity, answers must be made to all of the inquiries that are applicable, the words "animal," "steam," etc., being added by the agent to the different inquiries when necessary. For instance, Inquiry 31 calls for the cost of "electric line construction" and "electric equipment of cars;" in the report for a road operated by cable these inquiries should be changed to "cable line construction" and "cable equipment of cars," respectively.

In a number of instances independent street railway companies have recently been combined under one ownership. In such cases one report may be made for the operations of the entire company, provided the roads which were formerly operated as independent lines are located in the same city or immediate vicinity, but if the system of accounting will permit of the preparation of separate schedules, a separate report should be secured for each of the constituent companies. In preparing separate reports for subsidiary companies the name and address of the controlling company must be given in answer to Inquiry 5.

In addition to information as to railways, or portions of railways, that are in operation, the report should include the statistics for all additions or extensions during the year.

If a street railway is owned by a company whose general office is in another locality outside the territory assigned the agent, and a portion of the information must be obtained from such office, the agent should complete the schedule as far as possible from the data obtainable at the plant and forward it to the Census Office with a full statement of the facts, giving also the names and addresses of the persons from whom further information may be obtained.

Each agent will be furnished with a list giving the names and addresses of all street railways located in the territory assigned him, which were in existence, building, or chartered during the year ending June 30, 1902. He will be required to secure a report from each of these railroad companies provided the railroad plant was in operation, had been completed and ready for operation, or was in course of construction. Returns must not be secured for companies which had been chartered but which had not commenced the construction of the road. The fact that a railroad is contemplated or projected, but not necessarily building or in operation, is designated on the list as "proposed."

This list has been prepared from street railway directories and it may not contain the names of all street railways, therefore the agents must be constantly on the alert to discover other roads. They should make inquiry in each city or town they may visit for roads in that vicinity. If such roads are discovered and they are located in the territory assigned the agent he should proceed to secure the returns for the same.

The different cities must be visited in the order named on the list, unless the agent finds that railroad connections and local conditions make a change advisable. In such cases the character and necessity for the change must be given on the agent's daily report.

In all cases where an annual report of the railway is printed, a copy of the latest report should be secured and forwarded with the schedule. Copies should also be returned of printed tariff rates, reports of the directors or officers of the road, or other printed matter that would add to the information contained in the schedule.

A number of street railway companies generate electricity for sale to other roads, or for light, power, or other purposes. If, in such cases, the system of accounts used by the company will permit the preparation of separate and complete reports for the street railway plant and the electric light and power plant, respectively, the separate reports must be obtained. If the system of accounts will not permit of such a separation, one report should be secured for the entire plant, but in such cases a report must also be made on the schedule (Form 8-122) for electric light and power, and answers given to questions from 1 to 9, inclusive, and 15 to 29, inclusive, or such of them as are applicable to the plant reported.

All answers must be made clearly and neatly in ink. Amounts and values must be obtained from book accounts, if such accounts are available. Each question is to be answered. If any question is found not applicable and no amounts are reported, write the word "None."

An exact answer to each item enumerated in the several questions is what is required, and is what should be given if it can be secured with a reasonable amount of labor. It is anticipated, however, that in a number of plants the accounts are not kept under just such a series of items as has been enumerated. If the accounts cover two or more of the items enumerated for any of the inquiries, the total should be equitably apportioned for the reply to each subinquiry. In all cases where the answers are estimated the amounts must be preceded by the word "Estimate."

The cover of the schedule must be left blank, as the name of the company will be supplied after the receipt of the report at the Census Office.

Give on page 1 the name and location of the company, the address of the general offices, and the signature and official designation of the persons furnishing the information. If the address of the general or business office is at a different place from that of the plant, care must be taken to give both. The exact time covered by the report must be shown in the certificate.

Of the first 14 inquiries special attention is called to the following: 1. The date given must be the date of the charter under which the company reporting was organized and not the date of the original organization of the road unless the dates are the same. 7. Each change in the character of motive power must be described and the date given. If the change was only partial, the road being operated by two or more kinds of power, that fact must be noted. 10. The length of streets or roads over which cars are run must include length of track over fields or regions where there is no road or street. 12. Account in single track mileage, for the entire

length of the road operated by the company, including leased lines and lines operated under trackage rights. Separately report in answer to Inquiry 12 the number of miles of railway constructed but not in operation. 14. Give the number of years for which the franchises or amendments thereto were granted, and the date each expires.

INQUIRY 15.—ACCIDENTS.

In the return of killed or injured, "other persons" is meant to refer to foot passengers or persons riding in vehicles other than street cars that are in collision with the cars.

INQUIRY 16.—TRAFFIC, MILEAGE, AND MISCELLANEOUS STATISTICS.

Transfer passengers.—Many street railways voluntarily, or when required by law, give free transfers to passengers paying one fare, and desiring to ride over more than one line. These transfers are generally issued in the shape of tickets at junction transfer points, and sometimes the passengers step from one car to the other, without such tickets, under the eye of the transfer agent; and in this manner a continuous ride can be made over more than one road for the one fare. Careful count or estimate of transfers is made by all the roads granting them.

Passenger-car mileage.—It is an ordinary practice for street railways to keep an account of this mileage. Where it is not known, it can be arrived at by multiplying the average or actual number of cars in daily service by the number of miles run daily for the year. The other inquiry, "Passenger-car hours," is not obligatory, but is a new method of accounting for car operation and is already employed by some roads. Such roads, however, are large and the system of accounts is likely also to include the older and more familiar "Passenger-car mile." In many cases the mileage of other classes of service, such as freight, etc., will be a matter of estimate.

Maximum speed, etc.—The speed of street cars is almost universally regulated by specific law or ordinance, and the answer to the questions on speed within the city limits, will presumably be the limits which are thus enforced. When possible give the maximum speed within and outside the city limits.

Telephone lines for operation of roads.—Many street railways have their own regular car dispatching system, which is aided and supplemented by a telephone service belonging to the road, the wires being strung along the line. Other roads that may not have dispatchers place telephone boxes on their poles to enable communication between any conductor and headquarters. All of this service is independent of the local telephone system used by the public and furnished from a local exchange; and the inquiry does not include the instruments or lines that the street railway company may hire from the telephone company as a subscriber.

Stations.—By "stations" is meant separate buildings or public shelters at which passengers wait to take cars, pay fares, or secure transfers; and usually the transfer points will be much more numerous than the stations. The word is not intended to include, in any way, stopping points or open-air stations along a line where passengers can mount and dismount, and which are often designated by a sign to that effect placed on an adjacent pole.

Horses.—Give the total number of horses owned and used in any capacity in connection with the road.

Parks, pleasure resorts.—These are a feature of modern street railway business and often a large source of income. They have frequently been created by the companies themselves on their lines, and the data should be readily obtainable in every case. The agent must not, however, include in the return parks and pleasure grounds belonging to the community and entered by street railway systems; but if the company pays for the privilege of touching at these points a memorandum should be made of that fact, and the number of passengers thus specifically delivered within such pleasure resorts should be noted, if possible, as distinguished from traffic on lines terminating outside public parks or running around them.

INQUIRY 17.—TRACK.

The entire length of all track operated must be reported. The total mileage of first and second track must agree with the totals given in answer to Inquiry 12.

"Single track" means one set of rails in any thoroughfare. "Second track" means another pair of rails running alongside the first, so that cars can pass each other in opposite directions. Even in some of the largest cities there will be but one track in one street, the return route running parallel on another street nearby. On the other hand, there are streets that have three and four street railway tracks in them. It is desired to secure these details itemized, so that when the second track, and the length of sidings and turn-outs, is added to the single track, there will appear the total mileage of track owned by each road. At the same time, the return will then exhibit the proportion or extent to which single tracks and double tracks occupy the streets.

Right of way.—This term applies practically to rural electric railways, many of which have bought or have had surrendered to them a separate roadbed, either adjoining the highway or running across lots, in the same manner as a steam railroad. Occasionally the railway will not own the private right of way over which it runs, an instance of which would be a toll bridge owned by a bridge company to whom payment for the privilege is made.

Number of miles within city or municipal ordinance limits.—The object of this inquiry is to ascertain the miles of track within the incorporated limits of the different cities in which the road is located.

INQUIRY 18.—ELECTRIC LINE CONSTRUCTION.

In only one or two places will the agent find "double overhead" trolleys. The universal American practice is "single overhead" trolleys. In the former there are two trolley pole contacts above the car, by one of which the current flows into the car motors and by the other of which it flows out, or "completes the circuit." In this manner the track is not electrified. With the single overhead system, the current is led to the motors by the single overhead contact wheel and pole, and then the circuit is completed through the wheels and the track, the rails of which are all welded together or else are united into one continuous circuit by "rail bonds," i. e., usually pieces of copper fixed at each rail joint, and the whole network being connected to the dynamos at the generating power plant. The overhead trolley wire is held up between two sets of poles and sustained by "span wires," or it is held up by "center poles" placed in the middle of the thoroughfare and supporting a trolley wire on either side, above each track; or it is held up by side poles with "brackets." Iron or steel or wooden poles are usually used.

INQUIRY 19.—CARS, ETC.

Every street railway company keeps a close account of its rolling stock, and, though there are many varieties, they will all fall under the headings enumerated. Some cars, however, serve for more purposes than one, and these must not be counted twice. Closed cars or open cars that carry material and mail as well as passengers must be enumerated once only, as closed cars or as open cars; and a mail car that carries express and freight, or vice versa, must be treated only as a mail car or as an express car. The headings "mail," "express and freight," etc., designate cars that are solely and specifically devoted to such several uses. "Snowplows" and "sweepers" are often a composite vehicle, and in such cases must be counted only once, under either head.

INQUIRY 20.—FENDERS AND BRAKES.

The fender is usually a removable piece of apparatus, and where all the cars of a road are so equipped that fenders can be put on them when they are run out of the car barn for service, they should all be enumerated as equipped with fenders. If a car has no

fender attachments, it should not be counted here. "Brakes" are a permanent fixture on any car, and in the majority of instances will be of the ordinary "hand" kind. "Air" brakes are set by air compression mechanism and comprise those in which electric motors drive the air pumps. A few cars have "electric brakes," which are in reality "magnetic," and are often so called, a metallic cheek being clutched magnetically against the face of the wheel so as to arrest its motion. A track brake is one which engages with the track and not with the wheel, and may be of an electric character; but in the latter case it should be included under the electric class and a memorandum attached noting this fact.

INQUIRY 21.—HEATING OF CARS.

Give the number of cars heated by the different methods enumerated.

INQUIRY 22.—LIGHTING OF CARS.

Account for the total number of passenger cars, giving separately the number lighted by electricity, gas, and oil, respectively.

INQUIRY 23.—WEIGHT OF RAILS.

Give the maximum and minimum weight per yard of the steel rails in use at the time of making the report. It is likely that many street railway systems will have more than one weight of rail; the heaviest being used in cities, the lightest in the outskirts or where supported on ties and sleepers. If possible the style of rail should be noted, as indicated in the schedule. The agent may be informed of the existence of some iron rail, but this should be disregarded, as such rail has virtually gone out of manufacture and use.

INQUIRY 24.—CONDUIT SYSTEM FOR DISTRIBUTION.

This is intended to cover only conduit systems employed by the street railway company itself for the reception of its mains and feeders, it being required in many towns and cities that these go off the poles and be put underground. It is desired to ascertain how far the streets have been relieved by conduit systems of such obstructions, and the facts are readily obtainable. The return is asked for in "miles of duct," this meaning miles of separate pipe-way, each pipe-way receiving one cable or wire. Underground conduit is usually manufactured so that when laid under the street it presents several ducts or holes to be filled with electric cable for carrying current. One mile of street laid with conduit of six holes would thus represent 6 miles of duct. In cases where the feeders are inclosed in the conduit of underground trolley systems, note that fact and give the miles of conduit in which the feeder is carried.

INQUIRY 25.—BRIDGES BUILT FOR ROAD.

The object of this inquiry is to ascertain the number, character, and length of the bridges built by or for the use of the road. Do not account for the bridges over which the road has obtained the privilege of laying its tracks, but which were not built primarily for that purpose. The inquiry applies particularly to roads operated in rural districts.

INQUIRY 26.—POWER PLANT EQUIPMENT.

These are details that should in every instance be readily obtainable. If the manager or superintendent does not know the capacity of his boilers, he will probably know that of his engine, or of his dynamo, and all are closely related. The boiler capacity is almost invariably installed larger than the engine requires, and the engine has always a margin of more power than the dynamo calls for. Thus a dynamo of 150 horsepower will be driven by an engine of 175 horsepower, and the engine will be supplied with steam from a boiler that can furnish 200 horsepower. "Auxiliary engines" will sometimes be found in small railways, but in the larger plants they or electric motors are in common use to drive pumps, etc., and the superintendent or manager can readily enumerate them.

INQUIRY 27.—ELECTRICAL GENERATORS.

At the period covered by this inquiry every electric railway in the United States is operated by direct current motors, and current to those motors is furnished either by direct current generators (i. e., dynamos) or by "converters" which take alternating current from large alternating polyphase generators and convert it into direct current for consumption at the cars. There will be no difficulty in ascertaining the facts as to these different classes of apparatus, as only the larger systems employ alternating current for widespread distribution, and then usually in connection with substations, to which such current is delivered to be passed through transformers and converters so that it may be adapted for use by the direct current motors. Storage batteries are used, either in the main power plants or in the substations, to help maintain a steady supply of current at the right pressure, and "boosters" are dynamos assisting to the same end. The substation is particularly a feature of long distance rural electric railway work, but in every instance such roads have competent engineers, who can give the data should it not be in possession of the management.

INQUIRY 28.—SUBSTATION EQUIPMENT.

The feature of substation equipment is that it does not generate current, but receives it, manipulates it, stores it, and lowers the pressure or changes the form for local consumption. All the generating plants will usually be found in the generating stations, but sometimes substation apparatus will be found under the same roof as the generating main plant apparatus.

INQUIRY 29.—MAINS AND FEEDERS.

This inquiry does not mean the wire with which the trolley wheel makes contact, but has reference to the heavy circuits which bring current to feed the conductor. These mains and feeders in some places are still carried on poles, and are tapped at numerous points so that the current can be fed into the service conductor; but it is a rapidly growing practice to relieve the poles of their burden and to get them underground out of the way.

INQUIRY 30.—OUTPUT OF STATION.

This is an inquiry in regard to which some roads may have no data, although in many of them it is a matter of careful scientific accounting. In every case, the volts multiplied by the amperes will give the number of watts. A kilowatt is 1,000 watts. There are 746 watts in the old familiar horsepower, so that a kilowatt is roughly $1\frac{1}{4}$ horsepower. Watt hours are the product of watts multiplied by the number of hours during which the current is in use. Thus a power house with a dynamo delivering current to the line of 1,000 amperes at 550 volts pressure is generating 550,000 watts, or 550 kilowatts. If these 550,000 watts are furnished on an average twenty hours daily, we get 11,000,000 watt hours or 11,000 kilowatt hours. The total for the year can be arrived at from the daily total, and the horsepower of current can be figured from the kilowattage, or vice versa, by the simple calculation above given.

To facilitate the answers to the inquiries concerning financial operations, the Office has adopted the system of accounting devised by the Street Railway Accountants' Association of America and approved and recommended by the National Association of Railroad Commissioners. It is presumed that all street railway companies are familiar with this system of accounting, but the following instructions in regard to the items to be included in the answer to each inquiry are given to assist in their compilation:

In the following classification, "Labor" should be understood to mean, not only the manual work of laborers, but also superintendence, supervision, clerical work, engineering, and inspection, so far as they are chargeable to the account referred to.

"Material" should be understood to mean, not only finished or

unfinished products, appliances, or parts, but such smaller articles as are usually termed "supplies."

"Tools" should be understood to mean hand tools of mechanics and other tools used in the work chargeable to the account referred to.

"Expenses" should be understood to mean all expenses chargeable to the account referred to, that are not labor, material, or tools.

The cost of replacement, renewal, or repair of property destroyed or injured by fire, worn out, or otherwise unfitted for use, should be charged to the appropriate maintenance account, which should be credited with the amount received for insurance or realized from the sale of property so unfitted for use. But if the property substituted is of greater value than the original property, the excess should be charged to the capital or construction account to which the original property was charged; if of less value, the difference between the value of the property as repaired, renewed, or replaced, and its original cost or value should be credited to the capital or construction account to which the first cost was charged. So proceeds from the sale of scrap material should be credited to the account to which the cost of replacement of that material is charged, or, if not replaced, to the original cost account.

The cost of experiments should be charged in operating expenses to the account most affected.

INQUIRY 31.—CONSTRUCTION AND EQUIPMENT.

In cases where the road was purchased, or constructed under a contract, a lump sum being paid for the entire plant, it may be impossible to obtain separate amounts for each of the items specified. The total cost should then be ascertained and a careful segregation made which must be approved by the person furnishing the information.

1. *Organization*.—All expenses incurred in effecting organization, including legal expenses.

2. *Engineering and superintendence*.—All expenditures for services of engineers, draftsmen, and superintendents employed on preliminary and construction work, and all expenses incident to the work.

3. *Right of way*.—All expenditures in connection with securing or paying for right of way, including cost of real estate for right of way.

4. *Track and roadway construction*.—All expenditures for track and roadway construction, including labor, materials, tools, freight, hauling, distribution of material, and all other expenses incident to the work; cost of grading, excavating, track laying, ties, yokes, slot rails, manhole frames and covers, rails, rail fastenings, welded joints, special work (such as crossings, cross-overs, curves, frogs, guard rails, run-offs, switches, switch mates, turn-outs), ballasting, paving, fences (right of way), bridges and culverts, trestles, subways, and tunnels.

The cost of tracks in yards, terminals, car houses, or other buildings should be charged to this account.

The cost of punching and drilling rails for track wiring should be charged to account 5.

5. *Electric line construction*.—All expenditures for overhead, underground, third-rail, or surface contact electric line construction, including labor, material, tools, freight, hauling, distribution of material, and all other expenses incident to the work; cost of punching and drilling rails for track wiring, rail bonds, poles (iron and wood), labor and material for setting and painting poles; feed wire, guard wire, span wire, strain wire, supplementary wire, trolley wire, ground feeders, underground feeders, pole fixtures, hangers or suspensions, insulators (overhead), lightning arresters and appliances, signals and signaling apparatus, overhead crossings and switches, ground terminals, and all labor in connection with putting same in position; conduits and conduit appliances for underground trolley construction, including conductors, insulators, sewer connections, sewer traps, and underground feeders; third rails, and insulators for third-rail construction; surface contact appliances for surface contact roads, including magnets, contact boxes, manhole frames and covers.

6. *Real estate used in operation of road*.—All expenditures for real estate used in operation of road, except real estate used for right of way, which should be charged to account 3.

7. *Buildings and fixtures used in operation of road*.—All expenditures for buildings and fixtures used in operation of road, including labor, material, tools, freight, hauling of material, and all other expenses incident to the work. The term "buildings and fixtures" includes power houses, car houses, shops, office buildings (when owned by the company), waiting rooms, sheds, outhouses, coal bins, sand houses, stables, storehouses, switch tenders' houses, fences (except park and right of way), docks, wharves, and all other buildings and inclosures, and their stationary fixtures, including pipes for gas, water, sewage, and drainage, apparatus for heating, lighting, and ventilating, sidewalks, and paving in streets in front of and adjacent to the company's buildings (except in tracks), and inspection and repair pits in car houses, shops, or other buildings. The cost of tracks in yards, terminals, car houses, and other buildings should be charged to account 4. The cost of electric line in yards, terminals, car houses, and other buildings should be charged to account 5.

8. *Investment real estate*.—All expenditures for land and buildings not used in operation of road.

9. *Power plant equipment*.—All expenditures for steam and electric equipment of power plant, including foundations and installation. The equipment of substations (if used) should be charged to this account. All expenditures for waterpower machinery (if used) should be charged to this account. The cost of buildings used for main power house or substations should be charged to account 7.

10. *Shop tools and machinery*.—All expenditures for shop tools and machinery for general repair shops, car houses, etc., including foundations and installation.

11. *Cars*.—All expenditures for passenger, baggage, express, freight, mail, and other cars from the operations of which revenue is derived. The term "cars" includes car bodies and trucks, and all fixtures or appliances inside of or attached to the car body or truck (except the electric equipment of the car).

12. *Electric equipment of cars*.—All expenditures for electric equipment and wiring of all cars, whether revenue cars or work cars, including labor, material, tools, freight, hauling of material, and all other expenses incident to the work.

13. *Miscellaneous equipment*.—All expenditures for water cars, sprinkling cars, sand cars, salt cars, supply cars, and other work cars; snowplows, sweepers, scrapers, and miscellaneous snow equipment; horses, harness, wagons, and vehicles; tools and appliances necessary in the use of work cars or snow equipment.

14. *Interest and discount*.—All interest paid or received in connection with funds for construction, and all discounts or premiums resulting from the negotiation of securities for construction, should be charged or credited to this account.

15. *Miscellaneous*.—All expenditures for printing and stationery, office supplies and expenses, damage claims, wages of clerks, and all other expenses incident to construction not otherwise provided for.

Electric light and power service.—Amounts are to be reported in answer to this inquiry when electric current is sold for light, power, or other purposes. Include all expenditures for electric plant, line construction, lamps, motors, etc., that have not been included in the other items which pertain to the construction and equipment of the railway plant and line.

INQUIRY 32.—OPERATING EXPENSES.

1. *Maintenance of track and roadway*.—All expenditures for repairs and renewals of track and roadway, of culverts and subways, of tracks in yards, terminals, car houses or other buildings, including labor, material, tools, fuel, light, water, ice, freight, hauling, and distribution of material, and all other expenses incident to the work.

The cost of taking up track, whether new track is laid in its place or not, should be charged to this account.

The cost of punching and drilling rails for repairs or renewals of track wiring, and of removing and relaying pavement, ballast, etc.,

when necessary for repairs or renewals of the electric line, should be charged to account No. 2.

The cost of repairs and renewals of harness and wagons used in connection with this work should be charged to account No. 8.

The cost of feed and keep of horses used in connection with this work should be charged to account No. 30.

Following is a list of some of the items chargeable to this account:

Ballast.	Lumber.
Bolts.	Manhole covers, for underground trolley.
Braces, rail.	Manhole frames, for underground trolley.
Brick.	Molds, for welded joints.
Bridges.	Nails.
Cement.	Nuts.
Chairs, for rails.	Nut locks.
Cinders, for ballast.	Paving materials.
Coke, for welding joints.	Pig iron, for welded joints.
Clamps, for welded joints.	Pipes, drain.
Crossings.	Rails.
Cross-overs.	Run-offs.
Culverts.	Sand.
Curves.	Screws.
Drains.	Slot rails, for underground trolley.
Fences, right of way.	Spikes.
Fish plates.	Steel.
Freight.	Stone.
Frogs.	Subways.
Fuel.	Switches.
Guard rails.	Switch mates.
Gravel.	Ties.
Hauling.	Tie plates.
Ice, for ice water.	Tie rods.
Iron.	Tools.
Joints, welded.	Trestles.
Joints, not welded.	Tunnels.
Labor.	Turn-outs.
Light (lanterns and fixtures, oil, lampwicks, torches, candles, incandescent lamps and fixtures, arc lights and fixtures, globes, and carbons).	Washers.
	Water.
	Yokes, for underground trolley.

2. *Maintenance of electric, cable, etc., lines.*—All expenditures for repairs and renewals of overhead, underground, third-rail, or surface contact electric lines, and cable line, including labor, material, and tools employed or used in taking up, resetting, and painting and repainting poles, taking down trolley, feed, guard, and supplementary wires, and substituting new, repairing and renewing conduits for wires, repairing and renewing bond wires, punching and drilling rails for track wiring, removing and relaying pavement, ballast, etc., when necessary for repairs or renewals of the line, freight, hauling and distribution of material, fuel, light, water, and ice, and all other expenses incident to the work.

The cost of repairs and renewals of electric lines in yards, terminals, car houses, or other buildings should be charged to this account.

The cost of feed and keep of horses used in connection with this work should be charged to account No. 30.

The cost of repairs and renewals of harness and wagons used in connection with this work should be charged to account No. 8.

Following is a list of some of the items chargeable to this account:

Bolts.	Manhole covers, for surface contact roads.
Boxes, for lightning arresters.	Manhole frames, for surface contact roads.
Cement.	Nuts.
Charcoal.	Painting material, for poles.
Clamps, for poles.	Pins, iron, for cross arms.
Conductors, for underground trolley.	Pins, wood, for cross arms.
Conduits.	Poles, iron.
Contacts, for surface contact roads.	Poles, wood.
Contact boxes, for surface contact roads.	Pole tops, for iron poles.
Cord.	Rail bonds.
Cross arms, iron.	Sand.
Cross arms, wood.	Screws.
Crossings.	Sewer connections, for underground trolley.
Feeders, ground.	Sewer traps, for underground trolley.
Feeders, overhead.	Signals and signaling apparatus.
Feeders, underground.	Solder.
Freight.	Soldering salts.
Fuel.	Steel.
Gasoline.	Stone.
Hangers.	Suspensions.
Hauling.	Switches.
Ice, for ice water.	Tape, insulating.
Insulators, overhead.	Terminals.
Insulators, underground.	Third rails.
Insulators, for third rail.	Tools.
Iron.	Washers.
Labor.	Water.
Light (lanterns and fixtures, oil, lampwick, torches, candles, incandescent lamps and fixtures, arc lights and fixtures, globes, and carbons).	Wire, feed.
Lightning arresters and parts.	Wire, guard.
Magnets, for surface contact roads.	Wire, span.
	Wire, strain.
	Wire, supplementary.
	Wire, trolley.

3. *Maintenance of buildings and fixtures.*—All expenditures for repairs and renewals of buildings and fixtures used in the operation of the road, including labor, material, tools, freight, hauling of material, and all other expenses incident to the work.

The term "buildings and fixtures" includes power houses, car houses, shops, office buildings (when owned by the company), waiting rooms, sheds, outhouses, coal bins, sand houses, stables, storehouses, switch tenders' houses, fences (except park and right of way fences), docks, wharves, and all other buildings and inclosures, and their stationary fixtures, including pipes for gas, water, sewage, and drainage, apparatus for heating, lighting, and ventilating, sidewalks and pavements in front of and adjacent to the company's buildings (except in tracks), and inspection and repair pits in car houses, shops, or other buildings.

The cost of repairs and renewals of tracks in yards, terminals, car houses, or other buildings should be charged to account No. 1.

The cost of repairs and renewals of electric lines in yards, terminals, car houses, or other buildings should be charged to account No. 2.

Following is a list of some of the items chargeable to this account:

Awnings.	Pipes, drain.
Bolts.	Pipes, gas.
Bolt ends.	Pipes, sewer.
Brick.	Pipes, water.
Builders' hardware.	Pits in car houses and shops.
Building material.	Plumbing.
Building permits.	Rivets.
Cement.	Roofing material.
Cisterns.	Sand.
Drains.	Sash cord.
Excavations.	Sash weights.
Fences (except park and right of way).	Scales, platform.
Foundations.	Screws.
Freight.	Sewering.
Grading.	Shelving and other fixtures.
Hauling.	Shingles.
Heating apparatus and fixtures.	Sidewalks.
I-beams.	Slate.
Iron.	Spikes.
Labor.	Steel.
Laths.	Stone.
Lighting apparatus and fixtures.	Tools.
Lime.	Tile.
Lumber.	Turn-buckles.
Nails.	Ventilating apparatus and fixtures.
Nuts.	Washers.
Painting materials (oil, turpentine, varnish, lead, painters' supplies).	Water.
Paving in streets (except in connection with tracks).	Water connections.
Plaster.	Water meters.
	Wells.
	Wire.

4. *Maintenance of steam plant.*—All expenditures for labor, material, tools, freight, hauling of material, and all other expenses incident to repairs and renewals of steam plant or waterpower plant, including engines and engine parts, appliances and fixtures, belts, belt tighteners and fixtures, receivers, lubricators, and oiling devices; shafting, clutches, cranes, hoists, and other engine room appliances; boilers, boiler fittings and appliances; furnaces, economizers, stacks, mechanical draft machinery, pumps, feed water heaters, purifiers, tanks, condensers, coal and ash conveying machinery, mechanical stokers, and other boiler room appliances; piping and steam fitting, including valves, separators, water and sewer connections, and water meters.

Following is a list of some of the items chargeable to this account:

Ash conveying machinery.	Hoists.
Belts.	Injectors.
Belt fixtures.	Iron.
Belt tighteners.	Labor.
Boilers.	Lubricators.
Boiler appliances.	Oiling devices.
Boiler fittings.	Piping.
Bolts.	Pipe covering.
Cement.	Pipe fittings.
Clutches.	Pulleys.
Coal conveying machinery.	Pumps.
Condensers.	Purifiers.
Cranes.	Receivers.
Draft machinery.	Screws.
Economizers.	Separators.
Engines.	Sewer connections.
Engine appliances.	Shafting.
Engine fixtures.	Stacks.
Engine parts.	Steam fittings.
Fire brick.	Steel.
Fire clay.	Stokers, mechanical.
Freight.	Tanks.
Furnaces.	Tools.
Grate bars.	Water connections.
Hauling.	Water meters.
Heaters, feed water.	Waterpower machinery.

5. *Maintenance of electric, cable, etc., plant.*—All expenditures for labor, materials, tools, freight, hauling of material, and all other expenses incident to repairs and renewals of plant, including generators and generator parts, switchboards, cables, and feeder terminals and wiring in connection with same, storage batteries, transformers, boosters, rheostats, circuit breakers, ammeters, and other electric equipment.

Commutator brushes for generators should be charged to account No. 14.

Following is a list of some of the items chargeable to this account:

Ammeters.	Labor.
Boosters.	Lightning arresters and parts.
Cables.	Rheostats.
Circuit breakers.	Storage batteries.
Feeder terminals.	Switchboards.
Freight.	Switches.
Generators.	Tools.
Generator parts.	Transformers.
Hauling.	

6. *Maintenance of cars.*—All expenditures for repairs and renewals of passenger, baggage, express, freight, mail, and other cars from the operation of which revenue is derived, including labor, material, tools, freight, hauling of material, and all other expenses incident to the work.

The term "cars" includes car bodies and trucks and all fixtures or appliances inside of or attached to the car body or truck, except the electric equipment of the car.

The cost of cars purchased to keep good the original number of cars should be charged to this account.

Bell and register cord, trolley rope, incandescent lamps, commutator brushes, and other supplies for cars should be charged to account No. 21.

Following is a list of some of the items chargeable to this account:

Axles.	Labor.
Bells.	Life guards.
Bell cord fixtures.	Lumber.
Bolts.	Mirrors.
Brakes (hand or power).	Nails.
Brake appliances (hand or power).	Nuts.
Brake shoes.	Oil boxes.
Brasses.	Painting material.
Brass fixtures.	Pedestals.
Brass trimmings.	Pilots.
Bumpers.	Sand boxes, attached to cars.
Canvas.	Screws.
Cotters.	Seats.
Curtains.	Seat covering.
Curtain fixtures.	Seat fixtures.
Dashes and parts.	Signs.
Drawbars.	Sign fixtures.
Electric heaters.	Snow scrapers, attached to cars.
Electroliners.	Springs.
Fare registers.	Steel.
Fenders and parts.	Steps.
Floor mats.	Stoves.
Freight.	Stove fixtures.
Gates.	Tools.
Glass.	Trucks.
Gongs.	Truck frames and parts.
Grab handles.	Washers.
Hauling.	Wheels.
Headlights and parts.	Woodwork.
Iron.	

7. *Maintenance of electric, cable, equipment of cars.*—All expenditures for repairs and renewals of the electric or cable equipment and wiring of cars, whether revenue cars or work cars, including labor, material, tools, freight, hauling of material, and other expenses incident to the work.

The cost of shifting electric equipments from summer to winter cars, or vice versa, should be charged to this account.

The cost of equipments purchased to keep good the original number of equipments should be charged to this account.

The cost of commutator brushes, incandescent lamps, oil, and other supplies for the electric equipment of cars should be charged to account No. 21.

Following is a list of some of the items chargeable to this account:

Armatures and parts.	Labor.
Bearings.	Light circuits.
Bolts.	Lightning arresters and parts.
Brasses, armature, axle, gear case.	Motor frames.
Brush holders and parts.	Nuts.
Canvas.	Pinions.
Circuits, for heat, light, power.	Plows, for underground trolley cars.
Circuit breakers, automatic.	Power circuits.
Commutators and parts.	Rheostats.
Contact shoes for surface contact cars.	Screws.
Contact shoes for third rail cars.	Shafts.
Controllers and parts.	Springs.
Cotters.	Steel.
Cut-out boxes and parts.	Storage batteries, for storage battery cars.
Fields and parts.	Tape.
Frames, for motors.	Terminals.
Freight.	Tools.
Gears.	Trolley bases.
Gear cases and parts.	Trolley forks.
Hauling.	Trolley poles.
Heat circuits.	Trolley wheels and parts.
Insulating material.	Washers.
Iron.	Wiring.

8. *Maintenance of miscellaneous equipment.*—All expenditures for repairs and renewals of water cars, sprinkling cars, sand cars, salt cars, supply cars, other work cars, snowplows, sweepers, scrapers, miscellaneous snow equipment, wagons, and all other vehicles not operated for the purpose of revenue, including labor, material, tools, freight, hauling of material, and all other expenses incident to the work.

Replacing horses lost by death or worn out in the service, depreciation in value of horses, and repairs and renewals of all harness and vehicles should be charged to this account.

Repairs and renewals of the electric equipment of all work cars, snowplows, sweepers, etc., should be charged to account No. 7.

Following is a list of some of the items chargeable to this account:

Axles.	Labor.
Bolts.	Life guards.
Brakes (hand or power).	Lumber.
Brake appliances (hand or power).	Nails.
Brake shoes.	Nuts.
Brasses.	Oil boxes.
Brass fixtures.	Painting material.
Bumpers.	Pedestals.
Canvas.	Pilots.
Cotters.	Rattan, for sweepers.
Dashes and parts.	Sand boxes, attached to work cars.
Drawbars.	Screws.
Electroliners.	Snow scrapers, attached to work cars.
Fenders and parts.	Springs.
Freight.	Steel.
Glass.	Tools.
Gongs.	Trucks.
Grab handles.	Truck frames and parts.
Hauling.	Washers.
Headlights and parts.	Wheels.
Iron.	Woodwork.

9. *Miscellaneous shop expenses.*—All expenditures for repairs and renewals of shop tools, machinery, and appliances, such as engines, boilers, shafting, motors, etc., used in general repair work, including labor, tools, coal, coke, lubricants, waste, and other material, freight, hauling of material, fuel, light, water and ice, wages of master mechanic, shop foreman, engineers, firemen, and other employees engaged in operating shop engine, and all other expenses incident to the general repair shops.

Hand tools of mechanics or laborers used exclusively in connection with work chargeable to accounts Nos. 1 to 8, 14, 21, and 22 should not be charged to this account, but to the account benefited by their use.

Following is a list of some of the items chargeable to this account:

Belts and belt fixtures.	Light (lanterns and fixtures, oil, lampwicks, torches, candles, incandescent lamps, arc light globes, and carbons).
Boilers and boiler fittings.	Lubricants.
Bolts.	Lumber.
Brooms.	Motors and parts (for shop use only).
Charcoal.	Nails.
Clutches.	Nuts.
Coal.	Piping.
Coke.	Pipe covering.
Cotters.	Pipe fittings.
Cranes.	Pulleys.
Draft machinery.	Pumps.
Engines and parts.	Screws.
Engine appliances and fixtures.	Shafting.
Fire brick.	Stacks.
Fire clay.	Steam fittings.
Forges.	Steel.
Freight.	Tools, machine.
Fuel.	Tools, hand.
Furnaces and parts.	Washers.
Hauling.	Waste.
Heaters, feed water.	Water.
Hoists.	Welding compounds.
Ice, for ice water.	
Iron.	
Labor.	

10. *Power plant wages.*—All expenditures for labor in the power plant, except labor employed in making repairs or renewals.

This includes the wages of the following employees:

Boiler cleaners.	Oilers.
Chief engineer.	Other labor (boiler room).
Engineers.	Other labor (engine room).
Firemen.	Switchboard tenders.
Coal passers.	Water tenders.
Generator tenders.	

11. *Fuel for power.*—All expenditures for coal, oil, or gas used as fuel, or other fuel used at power plant, including freight and hauling.

12. *Water for power.*—All expenditures for water used to produce steam or to operate a waterpower plant.

13. *Lubricants and waste for power plant.*—All expenditures for lubrication of power plant, including oil, grease, waste, rags, etc.

14. *Miscellaneous supplies and expenses of power plant.*—All expenditures for operation of power plant not otherwise provided for.

Following is a list of some of the items chargeable to this account:

Boiler compound.	Matches.
Boiler inspection.	Mops.
Brooms.	Oil cans.
Brushes, fine.	Packing.
Brushes, for generators.	Polish.
Brushes, for scrubbing.	Sandpaper.
Buckets.	Soap.
Chamols skins.	Sponges.
Dusters.	Sprinkling cans.
Emery cloth.	Tools.
Fire buckets.	Water (except water charged in account No. 12).
Fire extinguishers.	Water gauge glasses.
Garnet paper.	Waste cans.
Hose.	
Ice, for ice water.	
Light (lanterns and fixtures, oil, lampwicks, torches, candles, incandescent lamps, arc light globes and carbons).	

15. *Hired power.*—All expenditures for power purchased from other companies or power plants.

16. *Superintendence of transportation.*—Wages of division superintendents, their assistants and aids, road officers, inspectors, and others employed in superintending transportation.

17. *Wages of conductors engaged in operating revenue cars.*

18. *Wages of motormen engaged in operating revenue cars.*

19. *Wages of other car service employees.*—Wages of starters, transfer agents, switch tenders, trolley men, trail-car couplers, and other car service employees.

20. *Wages of car house employees.*—Wages of car house foremen, watchmen, car placers, car shifters, car and motor inspectors, car cleaners, lamp and headlight tenders, car oilers, car stove firemen, trolley oilers, and other car house employees not engaged in making repairs or renewals.

The cost of shifting cars for the purpose of repairs or renewals should be charged to account No. 6 or 7.

21. *Car service supplies.*—All expenditures for lubricants and waste for cars and electric equipment of cars, incandescent lamps,

oil and other supplies for lighting cars, water and other supplies for cleaning cars, fuel for heating cars, bell and register cord, trolley rope, commutator brushes, tools, and other materials and supplies, except such as are used for repair or renewals of cars or electric equipment of cars.

Following is a list of some of the items chargeable to this account:

Batteries, dry, for electric bells in cars.	Lampwicks.
Bell cord.	Lubricants.
Brooms, for cars.	Matches.
Brushes, for car washing.	Mops.
Brushes, for motors.	Oil cans.
Buckets, for car washing.	Pokers.
Candles.	Polish.
Chamols skins.	Rags.
Chimneys, for headlights.	Register cord.
Coal hods, for cars.	Shakers.
Dusters.	Shovels.
Fuel, for cars.	Soap.
Fuses.	Sponges.
Hose, for car washing.	Stove blacking.
Illuminating oil.	Tools.
Incandescent lamps.	Trolley rope.
Kindling.	Waste.
	Water, for car washing.

22. *Miscellaneous car service expenses.*—Expenditures for secret inspection, transfers and tickets, conductors' books, punches, portable registers, tools for motormen, employees' badges and uniforms; cost of getting derailed cars on track and removing obstructions and wreckage; miscellaneous expenses of car houses, including fuel, light, water (except water used for car washing), and ice, and all other car service expenses not otherwise provided for.

Water used for car washing should be charged to account No. 21.

Following is a list of some of the items chargeable to this account:

Badges, for employees.	Portable registers.
Buckets, for car houses.	Secret inspection expenses.
Brooms, for car houses.	Sprinkling cans.
Conductors' books.	Tickets.
Conductors' fare boxes.	Tools.
Conductors' punches.	Tools, for motormen.
Fire buckets.	Transfers.
Fire extinguishers.	Uniforms.
Fuel, for car houses.	Water (except water for car washing).
Hose, for car houses.	Wrecking expenses.
Ice, for ice water.	
Light (lanterns and fixtures, oil, lampwicks, torches, candles, incandescent lamps, arc light globes and carbons).	

23. *Cleaning and sanding track.*—All expenditures for cleaning, erasing, watering, sprinkling, and removing dirt from track, sanding track, including wages of men engaged in the work, cost of sand and of hauling, drying, and distributing same, cost of track brooms and other tools, curve grease, water for sprinkling and watering track, and all other supplies and expenses incident to the work.

The cost of feed and keep of horses used in connection with this work should be charged to account No. 30.

The cost of repairs and renewals of harness and wagons, water, sprinkling, and sand cars used in connection with this work should be charged to account No. 8.

This account should not include cost of sprinkling rendered necessary by repairs or construction of track or paving.

The cost of sprinkling street (except tracks) in front of or adjacent to company's property should be charged to account No. 32.

Following is a list of some of the items chargeable to this account:

Curve grease.	Shovels.
Fuel for sand drier.	Track brooms.
Sand.	Track brushes.
Sand drier and parts.	Water.

24. *Removal of snow and ice.*—All expenditures for removal of snow and ice from tracks, whether done by the company or otherwise, including labor, material, tools, and expenses, cost of salt and of delivering of same in car houses or bins, and the wages of men engaged in salting track and operating snowplows, sweepers, scrapers, etc.

The cost of feed and keep of horses used in connection with this work should be charged to account No. 30.

The cost of repairs and renewals of harness, wagons, salt cars, snowplows, sweepers, scrapers, and miscellaneous snow equipment used in connection with this work should be charged to account No. 8.

25. *Salaries of general officers.*—Salaries of president, vice president, secretary, treasurer, auditor, general manager, assistant general manager, chief engineer, general superintendent, purchasing agent, and all other officers whose jurisdiction extends over the entire system.

26. *Salaries of clerks.*—The salaries of bookkeepers, cashiers, receivers, paymasters, stenographers, clerks employed in counting cash, tickets, and transfers, and all other clerks employed in the general office or elsewhere.

27. *Printing and stationery.*—Expenditures for printing, stationery, and stationery supplies, except as hereinafter provided.

The cost of printing tickets and transfers should be charged to account No. 22.

The cost of printing briefs and other legal papers should be charged to account No. 34 or 35.

The cost of printing signs, posters, and other advertising matter should be charged to account No. 31.

Following is a list of some of the items chargeable to this account:

Arm rests.	Paper cutters.
Binders.	Paper fasteners.
Blanks.	Paper files.
Blank books.	Paper weights.
Blotters.	Pencils.
Blotting paper.	Pencil erasers.
Carbon paper.	Pens.
Coin bags.	Penholders.
Copy (impression) books.	Penracks.
Copying brushes.	Pins.
Dating stamps.	Printing (except printing charged to accounts Nos. 22, 31, 34, 35).
Envelopes.	Rubber bands.
Eyelets.	Rubber stamps.
Eyelet punches.	Rulers.
Erasers.	Scrapbooks.
Hektographs.	Sealing wax.
Indexes.	Scales.
Ink.	Shears.
Inkstands.	Shipping tags.
Ink erasers.	Shipping tickets.
Letterpresses.	Shorthand books.
Mechanical calculators.	Sponges.
Mimeographs.	Sponge cups.
Money tags.	Tissue (impression) paper.
Money wrappers.	Typewriters.
Mucilage and brushes.	Typewriter supplies.
Numbering stamps.	Twine.
Oil paper.	Wastebaskets.
Paper (all kinds).	Wrapping paper.
Paper baskets.	
Paper clips.	

28. *Miscellaneous office expenses.*—The cost of office supplies, repairs and renewals of office furniture, wages of janitors, porters, and messengers, and all other office expenses.

The cost of printing, stationery, and stationery supplies should be charged to account No. 27, except as otherwise provided.

Following is a list of some of the items chargeable to this account:

Brooms.	Newspapers.
Brushes.	Periodicals.
Buckets.	Postage.
Chamois skins.	Soap.
Dusters.	Sponges.
Fuel.	Sprinkling cans.
Ice.	Towels.
Internal revenue stamps.	Towel service.
Light.	Water.
Maps.	

29. *Storeroom expenses.*—Salaries and expenses in connection with storerooms, including cost of sending material and supplies from general storeroom to branch storerooms, and the collecting of scrap material.

30. *Stable expenses.*—The cost of feed, keep, and shoeing of horses, and all other expenses.

This account should include the stable expenses of all horses, regardless of where they are used.

Replacing horses lost by death or worn out in service, depreciation in value of horses, and repairs and renewals of harness and vehicles should be charged to account No. 8.

Following is a list of some of the items chargeable to this account:

Bedding.	Horseshoeing supplies.
Blankets.	Horseshoeing (by contract).
Brooms.	Hose.
Brushes.	Hostlers, wages of.
Buckets.	Ice.
Chamois skins.	Light.
Currycombs.	Medicine.
Dusters.	Salt.
Feed.	Sponges.
Fire buckets.	Sprinkling cans.
Fire extinguishers.	Stablemen, wages of.
Fuel.	Veterinarian (salary or fees).
Horseshoers, wages of.	Water.

31. *Advertising and attractions.*—The cost of advertising of every description, including printing handbills, dodgers, posters, folders, etc., net expense of music, parks, park properties and resorts (after deducting all income from admittance fees, sale of privileges, etc.), and all donations made and other expenses incurred for the purpose of attracting travel.

32. *Miscellaneous general expenses.*—The cost of public telephone service, maintaining and operating private telephone systems, telegrams, subscriptions, and donations (except those provided for in account No. 31), traveling expenses of general officers and others connected with general office, and contingent expenses connected with the general management not otherwise provided for.

33. *Damages.*—Expenditures on account of property damaged and persons killed or injured, salaries and expenses of claim agents, investigators, adjusters, and others engaged in the investigation of accidents and adjustment of claims, salaries, fees and expenses of surgeons and doctors, nursing, hospital attendance, medical and surgical supplies, fees and expenses of coroners and undertakers, fees of witnesses and others, except lawyers' fees and court costs and expenses.

Following is a list of some of the items chargeable to this account:

Accident insurance premiums.	Doctors' fees or salaries.
Adjusters' expenses.	Funeral expenses.
Adjusters' salaries.	Hospital expenses.
Claim agents' expenses.	Investigators' expenses.
Claim agents' salaries.	Investigators' salaries.
Coroners' fees and expenses.	Medical supplies.
Damage claims for ejection from cars.	Nurses' expenses.
Damage claim for electrolysis.	Nurses' fees.
Damage claims for horses killed or injured.	Premiums for accident insurance.
Damage claims for persons killed or injured.	Surgeons' expenses.
Damage claims for property damaged.	Surgeons' fees.
Damage claims for wagons or vehicles damaged.	Surgeons' salaries.
Doctors' expenses.	Surgical supplies.
	Undertakers' expenses.
	Undertakers' fees.
	Witnesses' expenses.
	Witnesses' fees.

34. *Legal expenses in connection with damages.*—All legal expenses incurred in connection with the defense or settlement of damage claims.

The compensation of the general solicitor or counsel and other attorneys engaged partly in the defense and settlement of damage suits and partly in other legal work should be apportioned between this account and account No. 35.

The term "legal expense" should be understood to include the salary of general solicitor or counsel, salaries, fees, and expenses of attorneys, fees of court stenographers, unless included in court costs, cost of law books, printing of briefs, court records, and other papers, court costs, expenses connected with taking depositions, and all other court expenses.

35. *Other legal expenses.*—All legal expenses except those incurred in connection with the defense or settlement of damage claims.

The compensation of the general solicitor or counsel, and other attorneys engaged partly in the defense and settlement of damage

suits and partly in other legal work should be apportioned between this account and account No. 34.

36. *Rent of land and buildings.*—All rents paid for land and buildings used in the operation of the road.

37. *Rent of tracks and terminals.*—All rents paid for tracks and terminals, bridge rentals, and tolls. The word "terminals" is not meant to refer to depots, car houses, or other buildings at the termini of the road. Rents for these should be charged to account No. 36.

38. *Insurance.*—The cost of fire and boiler insurance.

Wages, etc.—Wages, supplies, and expenses incidental to the generation of current for sale, not included in any other of the above items. Amounts are to be reported for railway companies that sell electric current for light or power. Include all expenditures incident to the generation and sale of electric current and which have not been included in the answer to any of the other inquiries.

INQUIRY 33.—INCOME ACCOUNT.

Give only the actual cash received and disbursed during the year. Do not include bookkeeping items.

Chartered cars.—It is a practice on many street railways to hire out cars for special travel purposes. These are usually known as "chartered" cars, a definition which includes parlor cars, observation cars, theater cars, etc. For all of this class of work it is the custom to make a special and separate rate, and the roads doing this business should have no difficulty in giving the receipts from it.

Freight, mail, or express.—Of late years, street railways, and particularly suburban electric lines, have taken up the carriage of freight and express. Provision is made separately for receipts from these items, but it is possible they may be obtainable only as a lump sum, although it is desirable to separate them.

Miscellaneous income.—This item must include all amounts received from sources other than those enumerated, such as income from advertising, pleasure resorts, interest on deposits, from securities owned, leased lines, etc. The total must be the gross income of the company for the year.

"Miscellaneous taxes" include special taxes, such as car licenses, special taxes for police service at street crossings, but in such cases a note must be made on the schedule describing the tax or license.

INQUIRY 34.—BALANCE SHEET.

This condensed statement must balance and show the financial condition of the company on June 30, 1902, or the last day of the year for which the report is made. Any large items which would come under the head of "Sundries" should be stated specifically.

1165—05—28

INQUIRIES 35-36.—CAPITAL STOCK AND FUNDED DEBT.

Account for the entire amount of stock and bonds issued. Give full amount of dividends paid during the year. In some cases companies have been reorganized or consolidated and the new company has issued stock, the new stock being accepted by the holders of the original stock which was surrendered to the new company. The new company may also issue bonds and assume the debt represented by the bonds of the original companies, which may or may not be retired. In such cases there may be no cash realized on either the stock or bonds of the new company, but the amount of stock and bonds issued by the new company and also the stock and bonds of the original company outstanding must be given, and the agent should attach a memorandum to the schedule, giving a full explanation of the issues of both stock and bonds. The amounts of the old and new companies should be given separately.

INQUIRY 37.—EMPLOYEES, SALARIES, WAGES, ETC.

The salaries and wages reported here will also be included in the amounts reported for the different items, under Inquiry 32, "Operating Expenses," but this statement is required in order to obtain the number and wages for each class of employees. Account for all persons employed by the company, both in the management and in the operation of the road. Give the number of officers who receive salaries (not the number of stockholders) and the gross amount of their salaries. Report separately the number and wages of conductors, motormen, and other classes of employees specified. The salaries and wages should include board or rent furnished as part compensation. The average number employed during the year, is the number that would have continuous employment for the twelve months. There should be no difficulty in securing this information for the road of ordinary size, but it may be that the large companies keep an itemized pay roll, the total only being carried forward from each week or month. In such cases it will be necessary to either add the pay roll of each week or month, for each class of employees, or compute the aggregate for each class, using a pay roll for a representative week or month as the base. Results obtained by the latter method will be accepted.

INQUIRY 38.—NUMBER OF EMPLOYEES AT SPECIFIED DAILY RATES OF PAY.

This inquiry is designed to ascertain the number of employees for each of the 16 classes enumerated that receive daily rates of pay specified. If there are other daily rates enumerate them and give the number employed at each; also give the hour rates for overtime for each of the 16 classes.

INDEX.

- Accidents, number killed and injured by, 15, 352-375; classified by motor power of cars, 16; classified by population, 23; to employees, 352-375; to passengers, 352-375; form of schedule used in census inquiries regarding, 407; instructions to special agents regarding, 414.
- Adams, Dr. Wellington, 166, 167.
- Adrian Street Railway Company, 250, 286, 314, 338, 360.
- Advertising, expenditures for, 74, 75, 420.
- Alabama, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; woods used for car construction in, 193; power consumption in, 225, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; capital stock and funded debt in, 236-237; character and length of track in, 236, 276; list of companies in, 236; electric construction in, 276; roadbed in, 276; cars and miscellaneous equipment in, 304; power and generating plants in, 328; accidents in, 352; car hours in, 352; car mileage in, 352; maximum speed in, 352; passengers in, 352; bridges and tunnels in, 384; alternating-current dynamos in, 393; auxiliary electric equipment in, 397; substation equipment in, 401.
- Alabama City, Gadsden and Attalla Railway Company, 236, 276, 304, 328, 352, 384, 393.
- Albany and Hudson Railway and Power Company, 179, 254, 290, 316, 340, 364, 387, 392, 395, 399, 402.
- Albuquerque Street Railroad Company, 254, 290, 316, 340, 364.
- Algiers, McDonoughville and Gretna Railroad Company, 244, 282, 310, 334, 358.
- Allegheny Traction Company, 266.
- Allentown and Kutztown Traction Company, 262, 294, 320, 344, 368, 389, 400.
- Allentown and Reading Traction Company, 262.
- Allentown and Slatington Street Railway Company, 262.
- Alton Railway, Gas and Electric Company, 240, 280, 306, 330, 354.
- Altoona and Logan Valley Electric Railway Company, 262, 294, 320, 344, 368, 389, 400.
- American Railways Company of Philadelphia, 122.
- American Street Railway Association, rules formulated by, 188.
- Amesbury and Hampton Street Railway Company, 252.
- Amherst and Sunderland Street Railway Company, 246, 284, 312, 336, 358, 386, 398.
- Amsterdam Street Railroad Company, 254, 290, 316, 340, 364, 387.
- Anaconda Copper Mining Company, 252, 288, 314, 338, 362, 387, 392.
- Anacostia and Potomac River Railroad Company, 238, 278, 306, 330, 354.
- Animal power railways, 4, 12, 46, 48, 55, 56, 67, 77, 82, 84, 172, 224, 414.
- Anniston Electric and Gas Company, 236, 276, 304, 328, 352, 384, 397.
- Ardmore and Llanerch Street Railway Company, 266.
- Arizona, proportion of passengers to population in, 17; power consumption in, 226; power and generating plants in, 328; list of companies in, 236; capital stock and funded debt in, 236, 237; character and length of track in, 236, 276; electric construction in, 276; roadbed in, 276; cars and miscellaneous equipment in, 304; accidents in, 352; car hours in, 352; car mileage in, 352; maximum speed in, 352; passengers in, 352; bridges and tunnels in, 384.
- Arkansas, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376, 383; list of companies in, 236; capital stock and funded debt in, 236, 237; character and length of track in, 236, 276; electric construction in, 276; roadbed in, 276; cars and miscellaneous equipment in, 304; power and generating plants in, 328; accidents in, 352; car hours in, 352; car mileage in, 352; maximum speed in, 352; passengers in, 352; bridges and tunnels in, 384; alternating-current dynamos in, 393; auxiliary electric equipment in, 397.
- Arkansas City Street Railway Company, 244, 282, 310, 334, 358.
- Asheville and Craggy Mountain Railway Company, 258, 292, 318, 342, 366.
- Asheville Electric Company, 258, 292, 318, 342, 366, 388, 393, 395, 399, 402.
- Asheville Street Railroad Company, 258, 292, 318, 342, 366, 388.
- Ashland and Centralia Electric Railway Company, 268.
- Ashland Light, Power, and Street Railway Company, 274, 300, 326, 350, 374, 390, 396.
- Ashtabula Rapid Transit Company, 260, 292, 318, 344, 366.
- Assets and liabilities, of all companies in United States, 90, 91; form of schedule used in census inquiries regarding, 410.
- Astoria Electric Company, 262, 294, 320, 344, 368, 388.
- Atchison Railway, Light and Power Company, 244, 282, 310, 334, 358.
- Athens Electric Railway Company, 240, 278, 306, 330, 354, 392, 394.
- Athol and Orange Street Railway Company, 248, 286, 312, 356, 360.
- Atlanta, style and dimensions of cars in, 195.
- Atlantic Coast Electric Railroad Company (N. J.), 254, 288, 316, 340, 364, 387, 399.
- Atlantic Shore Line Railway Company (Me.), 246, 284, 310, 334, 358.
- Auburn City Railway Company, 254, 290, 316, 340, 364, 387.
- Auburn Interurban Electric Railroad Company, 254, 290, 316, 340, 364, 387.
- Augusta Railway and Electric Company (Ga.), 240, 278, 306, 330, 354, 392, 394, 397.
- Augusta, Winthrop and Gardiner Railway Company (Me.), 244, 284, 310, 334, 358.
- Aurora, Elgin and Chicago Railway Company, 211.
- Austin Electric Railway Company, 270, 298, 324, 348, 370.
- Austria, street railways in, 155; style of cars used in, 196.
- Bakersfield and Kern Electric Railway Company, 236, 276, 304, 328, 352.
- Ballston Terminal Railroad Company, 254, 290, 316, 340, 364, 387.
- Baltimore, traffic and trackage in, 24; capitalization in, 53; regulations governing franchises in, 128, 140; styles and dimensions of cars in, 193.
- Baltimore and Ohio Railroad Company, effect of electric railway competition on, 117.
- Baltimore and Washington Transit Company, 246, 284, 312, 336, 358, 386.
- Bangor and East Bangor Street Railway Company (Pa.), 262, 294, 320, 344, 368.
- Bangor, Hampden and Winterport Railway Company (Me.), 244, 284, 310, 334, 358, 385.
- Bangor, Orono and Old Town Railway Company (Me.), 244, 284, 310, 334, 358, 385.
- Barre and Montpelier Power and Traction Company, 272, 298, 324, 348, 372, 390, 400, 403.
- Baton Rouge Electric and Gas Company, 244, 282, 310, 334, 358, 394.
- Batteries, storage, 170, 171; number and horsepower of cells, 401-403.
- Battle Creek Traction Company, 215.
- Bay Cities Consolidated Street Railway Company, 250, 286, 314, 338, 360, 391.
- Bay City, trackage and traffic in, 19.
- Bay Shore Terminal Company, 272, 300, 324, 350, 372, 390.
- Beaver Valley Traction Company, 262, 294, 320, 344, 368.
- Belgium, street railways in, 156, 196.
- Bellows Falls and Saxtons River Railroad Company, 272, 298, 324, 348, 372, 390, 403.
- Bennington and Hoosick Valley Railway Company, 256, 290, 316, 342, 364, 388.
- Bentley-Knight system, description of, 164.
- Benton Harbor and St. Joseph Electric Railway and Light Company, 250, 286, 314, 338, 360, 395.
- Benton Power and Traction Company, 250, 286, 314, 338, 362.
- Berkley Street Railway Company, 272, 300, 324, 350, 372, 390.
- Berlin, sliding scale system in, 134; style of cars used in, 196.
- Bethlehem and Nazareth Passenger Railway Company, 262.
- Biddeford and Saco Railroad Company, 244, 284, 310, 334, 358.
- Binghamton Railway Company, 256, 290, 316, 340, 364, 387, 399, 402.

- Birmingham Railway, Light and Power Company, 236, 276, 304, 328, 352, 384, 393, 401.
- Black River Traction Company, 258, 292, 318, 342, 366, 388, 399, 402.
- Bleecker Street and Fulton Ferry Railroad Company, 123, 256.
- Bloomington and Normal Railway, Electric and Heating Company, 240, 280, 306, 330, 354, 385.
- Blue Hill Street Railway Company, 248, 284, 312, 336, 360, 386.
- Bobtail cars, number of, 191; objections to, 191.
- Boise Rapid Transit Company, 240, 278, 306, 330, 354, 392.
- Bonding, 177, 178.
- Bonds, number of companies issuing, 46.
- Bonham Electric Railway, Light and Power Company, 270, 298, 324, 348, 370, 390.
- Boone Electric Street Railway and Light Company, 242, 282, 308, 332, 356, 385, 394.
- Boosters, number and horsepower of, 397-400.
- Boston, trackage and traffic in, 24; capitalization in, 53; third-rail construction on elevated roads in, 179; description of tunnel in, 187, 188; style and dimensions of cars in, 193.
- Boston and Albany Railroad Company, effect of electric railway competition on, 117.
- Boston and Chelsea Railroad Company, 246.
- Boston and Maine Railroad Company, effect of electric railway competition on, 117, 118.
- Boston and Northern Street Railway, 5, 82, 123, 182, 209, 212, 246, 284, 312, 336, 360, 386, 394, 398, 401.
- Boston and Revere Electric Street Railway Company, 246.
- Boston Elevated Railway Company, 79, 82, 85, 121, 141, 174, 175, 179, 182, 185, 186, 189, 196, 200, 209, 211, 221, 246, 284, 312, 336, 386, 391, 398, 401.
- Boston Suburban Companies, 123.
- Boston Transit Commission, 187, 188.
- Boulder Railway and Utility Company, 54, 238, 276, 304, 328, 352, 393.
- Bowling Green Railway Company, 244, 282, 310, 334, 358.
- Bozeman Street Railway Company, 252, 288, 314, 338, 362.
- Brackets, side, 277-303.
- Bradford Electric Street Railway Company, 262, 294, 320, 346, 368, 389.
- Brakes, distribution of various kinds of, 203; shoes used for, 203; electro-magnetic, description of, 204; tests of, 204; form of schedule used in census inquiries regarding, 408; instructions to special agents regarding, 414, 415.
- Branford Lighting and Water Company, 238, 278, 306, 330, 352, 384, 394.
- Brattleboro Street Railway Company, 272, 298, 324, 348, 372, 393.
- Bridges, 186, 277-303, 384, 390, 408, 415.
- Bridgeton and Millville Traction Company, 254, 288, 316, 340, 362, 387, 402.
- Brigantine Transportation Company, 254, 288, 316, 340, 362, 387.
- Brightwood Railway Company, 238, 278, 306, 330, 354, 401.
- Brill solid truck frames, use of, 192.
- Bristol and Plainville Tramway Company (Conn.), 238, 278, 306, 330, 352, 384.
- Bristol Belt Line Railway Company (Tenn.), 270, 298, 324, 348, 370.
- Bristol County Street Railway Company (Mass.), 250, 286, 312, 336, 360, 386.
- Broad Ripple Traction Company (Ill.), 242, 280, 308, 332, 356.
- Broadway and Seventh Avenue Railway Company, 123, 256.
- Broadway Surface Railway, 123.
- Brockton and Plymouth Street Railway Company, 248, 286, 312, 336, 360, 394, 398, 401.
- Brooklyn, third-rail construction on elevated roads in, 179; span wire construction in, 182.
- Brooklyn City and Newtown Railroad Company, 258.
- Brooklyn City Railroad Company, 192, 258.
- Brooklyn Heights System, 190.
- Brooklyn Rapid Transit Company, 22, 52, 79, 81, 124, 179, 211, 258, 290, 318, 342, 364, 388, 391, 399, 402.
- Brown, Le Grand, 173, 174.
- Brownstown and Ewing Street Railway Company, 242, 280, 308, 332, 356.
- Brussels, conduit system in, 181.
- Budapest, conduit system in, 181; styles of cars used in, 196.
- Buffalo, trackage and traffic in, 24; concrete roadbed in, 173.
- Buffalo and Depew Railway Company, 256, 290, 316, 340, 364, 387.
- Buffalo and Williamsville Electric Railway Company, 258, 292, 318, 342, 366.
- Buffalo, Gardenville and Ebenezer Railway Company, 258, 292, 318, 342, 366, 388.
- Buffalo, Hamburg and Aurora Railway Company, 256, 290, 316, 340, 364.
- Buffalo Street Railway Company, 175, 190.
- Buildings, instructions to special agents regarding, 416, 417, 421.
- Burlington Railway and Light Company (Iowa), 242, 282, 308, 332, 356, 394.
- Burlington Traction Company (Vt.), 272, 298, 324, 348, 372.
- Business, retail, influences of interurban railways on, 112-116.
- Butler Passenger Railway Company, 262, 294, 320, 346, 368.
- Butte Electric Railway Company, 252, 288, 314, 338, 362, 387.
- Cable railways, capitalization of companies, 46; changes in, 48; cost of construction of, 48; operating earnings of, 67; percentage distribution of operating earnings of, 67; introduction of, 159; essential principles of, 159, 160; feeders used by, 184; changes introduced by, 192.
- Cairo Electric Railway Company, 240, 280, 308, 332, 354.
- Calais Street Railway Company, 244, 284, 310, 334, 358.
- California, proportion of passengers to population, 17; income accounts of companies in, 62-64; percentage of taxes to income in, 66; gross earnings from operation, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 136; miles of track in, reporting cast-welded joints, 178; span wire construction in, 181; center pole construction in, 182; number of cars in, 189; hand and air brakes in, 203; car houses in, 209; waterpower used in, 218; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 236; capital stock and funded debt in, 236, 237; character and length of track in, 236, 276; electric construction in, 276; roadbed in, 276; cars and miscellaneous equipment in, 304; power and generating plants in, 328; accidents in, 352; car hours in, 352; car mileage in, 352; maximum speed in, 352; passengers in, 352; bridges and tunnels in, 384; water wheels and gas engines in, 392; alternating-current dynamos in, 393; auxiliary electric equipment in, 397; substation equipment in, 401.
- California Street Cable Railroad Company, 236, 276, 304, 328, 352.
- Calumet Electric Street Railway Company, 240, 280, 308, 332, 354, 385, 394, 397.
- Cambria Incline Plane Company, 264, 296, 322, 346, 368, 389.
- Camden and Suburban Railway Company (N. J.), 227, 254, 288, 316, 340, 362, 387, 399, 402.
- Camden and Trenton Railway Company (N. J.), 254, 290, 316, 340, 364, 387.
- Camden Horse Railroad Company (N. J.), 254.
- Camden Interstate Railway Company (W. Va.), 272, 300, 326, 350, 372, 390, 396, 400, 403.
- Camden, Gloucester and Woodbury Railway Company (owned by South Jersey Gas, Electric and Traction Company) (N. J.), 254, 288, 316, 340, 362, 387.
- Canton-Akron Railway Company, 260, 292, 318, 344, 366, 395, 399, 402.
- Capital stock, by states and territories, 64, 91.
- Capital stock and funded debt, per cent issued and outstanding of, amount of, per mile, 46; form of schedule used in census inquiries regarding, 410.
- Capital Traction Company, 81, 238, 278, 306, 330, 354, 384, 391, 397.
- Capitalization, causes tending to increase, 47; reconstruction in relation to, 47-49; regulation of, by state or municipality, 133.
- Car hours, classified, by power, 15; by population, 22, 23; by companies and states 352-375.
- Car hour unit, value of, 226, 227.
- Car houses, number and distribution of, 209; construction and equipment of, 191, 210; methods of lighting, 211.
- Car mile, passengers per, by urban centers, 26.
- Car mile unit, value of, 227.
- Car mileage, classified by power, 14; different bases for computing, 14; classified by population, 21; amount of, by states, 226; by companies and states, 352-375.
- Car service, instructions to special agents regarding, 419.
- Carbondale Railway Company, 268.
- Carlisle and Mt. Holly Railway Company, 262, 294, 320, 346, 368, 389.
- Carrollton Electric Railway Company, 252, 288, 314, 338, 362, 387.
- Carrying capacity, surface railways, causes limiting, 34, 35; inadequacy of, 35. *See also* Transportation.
- Cars, number of, 8, 9, 189; operating expenses of, 72, 74; operation of, percentage distribution of expenses, 76; distribution of, 189; express, freight, and mail, 189; passenger, number and style of, 189; in connection with miscellaneous equipment, general account of, 189-213; work and miscellaneous, distribution of, 190; bobtail, number of, objection to, 191; horse, objections to, 191; electric, early forms of, 192, 193; electric, style of modern construction of, 193; general dimensions of, 193; upholstery of, 193; elevated, number and distribution of, 196; heating of, 207; interurban, styles of, 215; freight, use of, 216; passengers, number of, 304-327; heated, number of, 305-327; lighted, number of, 305-327; with brakes, number of, 305-327; freight, mileage of, 352-375; mail, mileage of, 352-375; passenger, mileage of, 352-375; form of schedule used in census inquiries regarding, 408; instructions to special agents regarding, 415.
- Catharine and Bainbridge Street Railway Company, 266.
- Catskill Electric Railway Company, 256, 290, 316, 340, 364.
- Cedar Rapids and Marion City Railway Company, 242, 282, 308, 332, 356, 385, 398.
- Census of 1890, comparison with, 6-11.
- Centennial Passenger Railway Company, 266.
- Central Crosstown Railroad Company, 124, 256, 290, 316, 342, 364.
- Central Park and North and East River Railway Company, 123, 456.

- Central Railway Company, 242, 280, 308, 332, 356, 385, 397.
- Centralia and Central City Street Railway Company, 240, 280, 308, 332, 354.
- Charleston Consolidated Railway, Gas and Electric Company, 270, 298, 324, 348, 370, 389, 396, 400.
- Charlotte Electric Railway, Light and Power Company, 258, 292, 318, 342, 366, 388, 395, 399.
- Charlottesville City and Suburban Railway Company, 272, 298, 324, 350, 372, 390, 400.
- Charters, right to exist, granted by state, 126; duration of, limited by state constitutions, 128.
- Chattanooga Electric Railway Company, 270, 298, 324, 348, 370, 389.
- Chelton Avenue Passenger Railway Company, 266.
- Chester and Delaware Street Railway Company, 262.
- Chester and Derry Railroad Association (N. H.), 252, 288, 316, 340, 362.
- Chester and Media Electric Railway Company, 262.
- Chester, Darby and Philadelphia Railway Company, 262.
- Chester Street Railway Company, 262.
- Chester Traction Company, 262, 294, 320, 346, 368, 389, 400.
- Chicago, trackage and traffic in, 24; railways radiating from, 103; effort to secure municipal ownership of railways in, 136; franchise regulations in, 138; conduit system in, 179; third-rail construction in, 179; description of tunnels in, 187; style and dimensions of cars, 193; elevated systems in, 196.
- Chicago and Des Plaines Valley Electric Railway Company, 240.
- Chicago and Joliet Electric Railway Company, 240, 280, 308, 332, 356, 385, 401.
- Chicago and Milwaukee Electric Railway Company, 240, 280, 308, 332, 356, 385, 394, 397, 401.
- Chicago and North Shore Street Railway Company, 240.
- Chicago, Cincinnati and Louisville Railroad Company, effect of electric railway competition on, 117.
- Chicago City Railway Company, 53, 79, 82, 175, 209, 212, 240, 280, 308, 332, 354, 391, 397.
- Chicago Consolidated Traction Company, 240, 280, 308, 332, 354, 385, 397.
- Chicago Edison Company, 228.
- Chicago Electric Traction Company, 240, 280, 308, 332, 354, 385, 397.
- Chicago General Electric Railway Company, 240, 280, 308, 332, 356.
- Chicago General Railway Company, 240, 280, 308, 332, 356.
- Chicago, Harvard, and Geneva Lake Railway Company, 242, 280, 308, 332, 356.
- Chicago Passenger Railway Company, 240.
- Chicago Union Traction Company, 79, 81, 209, 212, 240, 280, 308, 332, 354, 385, 391, 392, 397.
- Chicago West Division Railway Company, 240.
- Chillicothe Electric Railroad, Light and Power Company, 260, 292, 318, 344, 366, 395.
- Chippewa Valley Electric Railroad Company, 274, 300, 326, 350, 374, 390, 400, 403.
- Christopher and Tenth Street Railroad Company, 256.
- Cincinnati, trackage and traffic in, 24.
- Cincinnati, Dayton and Toledo Traction Company, 217, 260, 292, 318, 344, 366, 388, 399, 402.
- Cincinnati, Georgetown and Portsmouth Railroad Company, 118.
- Cincinnati, Lawrenceburg and Aurora Electric Street Railroad Company, 260, 292, 318, 344, 366, 388.
- Cincinnati, Newport and Covington Railway Company (Ky.), 244, 282, 310, 334, 358, 385.
- Cincinnati Street Railway Company, 121, 260.
- Cincinnati Traction Company, 79, 182, 189, 260, 292, 318, 344, 366, 399.
- Circuit systems, description of, 165, 166.
- Citizens Clearfield and Cambria Street Railway Company (Pa.), 266.
- Citizens East End Street Railway Company (Pa.), 266.
- Citizens Electric Company (Ark.), 236, 276, 304, 328, 352.
- Citizens Electric Street Railway Company (Mass.), 248, 286, 312, 336, 360, 386.
- Citizens Light and Transit Company (Ark.), 236, 276, 304, 328, 352, 384, 393, 397.
- Citizens Passenger Railway Company (Pa.), 264, 266.
- Citizens Railway and Light Company (Iowa), 244, 282, 310, 334, 356, 398.
- Citizens Railway Company (Tex.), 270, 298, 324, 348, 372, 390.
- Citizens Railway, Light and Power Company (Va.), 272, 300, 324, 350, 372, 390, 396, 403.
- Citizens Street Railway Company (Mo.), 252, 288, 314, 338, 362.
- Citizens Street Railway Company (N. Y.), 256, 290, 316, 340, 364.
- Citizens Traction Company (Pa.), 264, 266, 296, 322, 346, 368, 389, 393.
- City and Suburban Railway Company (Oreg.), 262, 294, 320, 344, 368, 396.
- City and Suburban Railway of Washington, D. C., 238, 278, 306, 330, 354, 384, 391, 401.
- City Electric Railway Company (Ga.), 240, 278, 306, 330, 354, 394.
- City Island Railroad Company, 258, 290, 318, 342, 364.
- City Railway Company, 260, 292, 320, 344, 366.
- Clerks, number and salaries of, 232.
- Cleveland, trackage and traffic in, 24; radiation of railways from, 103; fares and transfer privileges in, 145.
- Cleveland City Railway Company, 79, 82, 182, 260, 292, 320, 344, 366, 399.
- Cleveland Electric Railway Company, 79, 175, 182, 211, 260, 292, 320, 344, 366, 388, 399.
- Cleveland, Elyria and Western Railway Company, 260, 292, 320, 344, 366, 388.
- Cleveland, Painesville and Eastern Railroad Company, 260, 292, 320, 344, 366, 388, 399.
- Clinton Street Railway Company, 252, 288, 314, 338, 362.
- Coal Belt Electric Railway Company, 242, 280, 308, 332, 356, 385, 397.
- Cohoes City Railway Company, 256, 290, 316, 340, 364.
- Collegeville Electric Street Railway Company, 264.
- Colorado, proportion of passengers to population in, 17; companies failing to report financial transactions in, 54; income accounts of companies in, 62-64; earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; franchise laws in, 137; light weight T rail in, 179; span wire construction in, 181, 182; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies, 238; capital stock and funded debt in, 238, 239; character and length of track in, 238, 276; electric construction in, 276; roadbed in, 276; cars and miscellaneous equipment in, 304; power and generating plants in, 328; accidents in, 352; car hours in, 352; car mileage in, 352; maximum speed in, 352; passengers in, 352; bridges and tunnels in, 384; water wheels and gas engines in, 392; alternating-current dynamos in, 393; auxiliary electric equipment in, 397.
- Colorado Springs and Cripple Creek District Railway Company, 238, 276, 304, 328, 352, 384, 392, 393, 397.
- Colorado Springs Rapid Transit Railway Company, 238, 276, 304, 328, 352, 384, 397.
- Colton, Doctor, 160.
- Columbia and Montour Electric Railway Company (Pa.), 262, 294, 320, 346, 368, 389, 396, 400, 402.
- Columbia Electric Street Railway, Light and Power Company (S. C.), 270, 298, 324, 348, 370, 389, 400, 403.
- Columbia Railway Company (D. C.), 238, 278, 306, 330, 354, 384, 397.
- Columbus, Ohio, trackage and traffic in, 24; fares in, 128.
- Columbus Avenue Company (N. Y.), 123.
- Columbus, Buckeye Lake and Newark Traction Company (Ohio), 260, 292, 320, 344, 366, 388, 395, 399, 402.
- Columbus, Delaware and Marion Railways Company (Ohio), 215.
- Columbus, Grove City and Southwestern Railway Company (Ohio), 260.
- Columbus, London and Springfield Railway Company (Ohio), 260, 292, 320, 344, 366, 388, 395, 399, 402.
- Columbus Railroad Company (Ga.), 240, 278, 306, 330, 354, 385, 392, 394, 397.
- Columbus Railway Company (Ohio), 134, 145, 260, 292, 320, 344, 366.
- Commission, railroad, authority of, in Massachusetts, 126.
- Common stock. *See* Stock, common and preferred.
- Commonwealth Avenue Street Railway Company, 248, 286, 312, 336, 360.
- Companies, classification of, 4, 5, 7, 11-23; percentage of gross receipts of, 132; capital stock and funded debt of, 236-275; length of track of, 236-275.
- Compressed air, use of, in car equipment, 204.
- Concord and Boston Street Railway Company (Mass.), 246.
- Concord, Maynard and Hudson Street Railway Company (Mass.), 248, 284, 312, 336, 360, 386.
- Concord Street Railway Company (N. H.), 252, 288, 316, 340, 362, 399.
- Concrete, use of, for roadbeds, 173.
- Conductors, number and wages of, 233.
- Conduit systems, 179-181; description of building of, 181; feeder, 183, 391; instructions to special agents regarding, 415.
- Conestoga Traction Company, 264, 296, 322, 346, 368, 389, 396, 400, 402.
- Coney Island and Brooklyn Railroad Company, 82, 258, 290, 318, 342, 364, 399.
- Conneaut and Erie Traction Company, 186.
- Connecticut, proportion of passengers to population, 17; companies failing to report financial transactions in, 54; income accounts of companies in, 62-65; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; legislative authority over charters in, 126; franchise laws in, 137; light weight T rail in, 179; third rail construction in, 179; car lighting in, 206; car houses in, 209; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 238; capital stock and funded debt in, 238-239; character and length of track in, 238, 278; electric construction in, 278; roadbed in, 278; cars and miscellaneous equipment in, 306; power and generating plants in, 330; accidents in,

- Connecticut—Continued.
352; car hours in, 352; car mileage in, 352; maximum speed in, 352; passengers in, 352; bridges and tunnels in, 384; water wheels and gas engines in, 392; alternating-current dynamos in, 394; auxiliary electric equipment in, 397; substation equipment in, 401.
- Connecticut Railway and Lighting Company, 122, 238, 278, 306, 330, 352, 384, 394, 397.
- Connellsville Suburban Street Railway Company, 262, 294, 320, 346, 368, 389.
- Conshohocken Railway Company, 264.
- Consolidated Company (Ohio), 260, 292, 318, 344, 366, 395.
- Consolidated Railway and Power Company (Utah), 270, 298, 324, 348, 372, 390.
- Consolidated Railways, Light and Power Company (N. C.), 258, 292, 318, 342, 366.
- Consolidated Street Railway Company (Kans.), 244, 282, 310, 334, 358.
- Consolidated Traction Company (N. J.), 254, 266.
- Consolidation, advantages of, 7, 120-122.
- Construction, cost of, 47, 90-93; electric, 181-186, 276-303; improvement in, 191; instructions to special agents regarding, 414.
- Continental Passenger Railway Company, 264.
- Controllers, description of, 199, 201.
- Converters, rotary, number and power of, 401-403.
- Conway Electric Street Railway Company, 248, 284, 312, 336, 360, 386.
- Coplay, Egypt and Ironton Street Railway Company, 262.
- Corning and Painted Post Street Railway Company, 256, 290, 316, 340, 364, 387.
- Cortland County Traction Company, 256, 290, 316, 340, 364, 387, 395, 402.
- Cottage City and Edgartown Traction Company, 248, 284, 312, 336, 360.
- Couplers, description of, 202.
- Covington and Oxford Street Railway Company, 240, 278, 306, 330, 354, 385.
- Crossings, steam railroad, number and kind of, 188, 276-303.
- Crosstown Street Railway Company, 79, 256, 290, 316, 340, 364, 387.
- Cumberland and Westernport Electric Railway Company, 246, 284, 312, 336, 358.
- Cumberland Electric Railway Company, 246, 284, 312, 336, 358.
- Cumberland Valley Traction Company (Pa.), 262, 294, 320, 346, 368, 389.
- Current, direct. See Generators.
- Daft, Leo, electric railway lines constructed by, 162, 163, 169.
- Dallas, Tex., trackage and traffic in, 19.
- Dallas Consolidated Electric Street Railway Company, 270, 298, 324, 348, 370.
- Damages, expenditures for, 74-76; instructions to special agents regarding, 420.
- Danbury and Bethel Street Railway Company, 238, 278, 306, 330, 352.
- Danville, Paxton and Northern Railroad Company (Ill.), 240, 280, 308, 332, 356, 385.
- Danville Railway and Electric Company (Va.), 272, 298, 324, 350, 372.
- Danville Street Railway and Light Company (Ill.), 240, 280, 308, 332, 356, 394, 401.
- Dartmouth and Westport Street Railway Company, 248, 284, 312, 336, 360, 386.
- Davenport, Thomas, pioneer in electric traction work, 160.
- Dayton, Ohio, trackage and traffic in, 19.
- Dayton and Northern Traction Company, 260, 294, 320, 344, 366, 388, 396, 399.
- Dayton and Troy Electric Railway Company, 216, 260, 294, 320, 344, 366, 388, 399.
- Dayton and Western Traction Company, 260, 294, 320, 344, 366, 388, 399.
- Dayton and Xenia Transit Company, 260, 294, 320, 344, 366, 388.
- Dayton, Springfield and Urbana Electric Railway Company, 260, 294, 320, 344, 366, 388, 399.
- Decatur Street Railway Company (Ala.), 236, 276, 304, 328, 352.
- Decatur Traction and Electric Company (Ill.), 240, 280, 308, 332, 356.
- Deficit, net, 90.
- Delaware, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 238; capital stock and funded debt in, 238, 239; character and length of track in, 238, 278; electric construction in, 278; roadbed in, 278; cars and miscellaneous equipment in, 306; power and generating plants in, 330; accidents in, 354; car hours in, 354; car mileage in, 354; maximum speed in, 354; passengers in, 354; bridges and tunnels in, 384; auxiliary electric equipment in, 397.
- Delaware County and Philadelphia Electric Railway Company (Pa.), 266, 296, 322, 346, 370, 389, 400.
- Delaware Electric Street Railway Company (Ohio), 260, 294, 320, 344, 366.
- Denison and Sherman Railway Company, 270, 298, 324, 348, 372, 390.
- Denver, Colo., trackage and traffic in, 24; style and dimension of cars in, 195.
- Denver City Tramway Company, 175, 176, 181, 182, 238, 276, 304, 328, 352, 384.
- Denver, Lakewood and Golden Railroad Company, 238, 276, 304, 328, 352, 384.
- Des Moines City Railway Company, 242, 282, 310, 334, 356, 385, 398.
- Detroit, railways radiating from, 103; fare regulations in, 142; style and dimension of cars in, 194.
- Detroit and Port Huron Shore Line Railway Company, 250, 286, 314, 338, 360, 386, 395, 398, 402.
- Detroit, Plymouth and Northville Railway Company, 250, 286, 314, 338, 362, 386.
- Detroit Street Railway Company, 142.
- Detroit United Railway Company, 5, 81, 101, 121, 189, 211, 212, 250, 286, 314, 338, 360, 386, 395, 398, 402.
- Detroit, Ypsilanti, Ann Arbor and Jackson Railway Company, 111, 250, 286, 314, 338, 360, 386, 395, 398, 402.
- District of Columbia, dividends in, 82; power consumption in, 226; list of companies in, 238; capital stock and funded debt in, 238, 239; character and length of track in, 238, 276; electric construction in, 278; roadbed in, 278; cars and miscellaneous equipment in, 306; power and generating plants in, 330; accidents in, 354; car hours in, 354; car mileage in, 354; maximum speed in, 354; passengers in, 354; bridges and tunnels in, 384; feeder conduit system in, 391; auxiliary electric equipment in, 397; substation, equipment of, 401.
- Dividends for all companies, 57, 79-82, 90, 91.
- Dover, Somersworth and Rochester Street Railway Company, 252.
- Doylestown and Easton Street Railway Company, 262, 294, 320, 346, 368, 389.
- Doylestown and Willow Grove Railway Company, 125, 262, 294, 320, 346, 368, 389.
- Dry Dock, East Broadway and Battery Railroad Company, 124, 256, 290, 318, 342, 364.
- Dubois Traction Company, 264, 294, 320, 346, 368.
- Dubuque, Iowa, trackage and traffic in, 19.
- Duluth, Minn., trackage and traffic in, 19.
- Duluth-Superior Traction Company, 181, 250, 286, 314, 338, 362, 387.
- Dunkirk, N. Y., trackage and traffic in, 19.
- Dunkirk and Fredonia Railroad Company, 256, 290, 316, 340, 364, 395.
- Dunkirk and Point Gratiot Traction Company, 256, 290, 316, 340, 364.
- Duquesne Incline Plane Company, 268, 296, 322, 346, 370.
- Durango Railway and Realty Company, 238, 276, 304, 328, 352.
- Dynamomen, number and wages of, 234, 235.
- Dynamos, invention of, 161; number of, 218; direct current, number and horsepower of, 219, 328-351; alternating-current, number and horsepower of, 219, 393-396.
- Earnings, operating, gross income distinguished from, 55; according to power, 66, 67; according to population, 68; by States, 69; per mile of track, 104; per car mile, 105; relation of, to population, 105, 106; difficulty in taxing, 132.
- East End Passenger Railway Company, 268, 296, 322, 346, 370.
- East Hardford and Glastonburg Street Railway Company, 238.
- East Liverpool and Rock Springs Street Railway Company (W. Va.), 272, 300, 326, 350, 372.
- East Liverpool Railway Company (Ohio), 260, 294, 320, 344, 366, 388.
- East McKeesport Street Railway Company, 266.
- East Middlesex Street Railway Company, 246.
- East Reading Electric Railway Company, 268.
- East St. Louis and Suburban Railway Company, 240, 280, 308, 332, 356, 385.
- East St. Louis Railway Company, 240, 280, 308, 332, 356.
- East Santa Cruz Street Railroad Company, 236, 276, 304, 328, 352, 384.
- East Side Traction Company, 258.
- East Taunton Street Railway Company, 250, 286, 312, 336, 360, 386.
- Eastern Ohio Traction Company, 260, 292, 320, 344, 366, 388, 395, 399, 402.
- Easton Consolidated Electric Company (lessor), 262.
- Easton and Bethlehem Transit Company, 262.
- Easton and Nazareth Street Railway Company, 264, 294, 320, 346, 368, 389.
- Easton, Palmer and Bethlehem Street Railway Company (lessor), 262.
- Easton Transit Company, 262.
- Eckington and Soldiers' Home, 182.
- Edison, Thomas A., electric railway work of, 161, 162.
- Egypt Electric Company, 240, 280, 308, 332, 354, 394.
- Eighth Avenue Railroad Company, 123, 256.
- El Paso Electric Railway Company, 270, 298, 324, 348, 372, 390.
- Electro-magneto braking, 204.
- Electro-magnetic engine, exhibition of, by Thomas Davenport, 160.
- Electro-magnetic locomotive, exhibition of, by Prof. Moses G. Farmer, 160.
- Electro-magnetic power, patented by Thomas Davenport, 160.
- Electric Railway and Ice Company (Kans.), 244, 282, 310, 334, 358, 385.
- Electric Railway and Power Company (Ohio), 260, 294, 320, 344, 368.
- Electric Street Railway of Clarksville (Tenn.), 270, 298, 324, 348, 370, 389.
- Electric Traction Company (Pa.), 266.
- Electricians, number and wages of, 234, 235.
- Electricity, difficulties encountered by steam railways in use of, for suburban trains,

Electricity—Continued.

119; recognition of, as motive power, 160; supplanting of steampower by, on elevated railways, 169.
Elevated railways, classification of, 4, 12; necessity for, 35, 36, 38; capitalization of, 46; income account of, 55, 56; operating earnings of, 67; operating expenses of, 77; general results of operation of, 82; operating ratio of, 84; equipment and development of, 169, 170; number and distribution of cars on, 196; precautions against fire in construction of cars, 197.
Elgin, Aurora and Southern Traction Company, 240, 280, 306, 330, 354, 385, 397.
Elizabeth, Plainfield and Central Jersey Railway Company, 254, 288, 316, 340, 362, 387.
Elmira and Seneca Lake Railway Company, 258, 292, 318, 342, 366, 388.
Elmira Water, Light and Railroad Company, 256, 290, 316, 340, 364, 387, 395.
Empire Passenger Railway Company, 266.
Employees, of operating and lessor companies, 6, 7; number of, 8, 94; number of, per mile of track, 95; salaried, number of, per 100,000 car miles, 95; salaried, number of, per 100,000 fare passengers, 95; form of schedule used in census inquiries regarding, 411; instructions to special agents regarding, 419, 421.
Engineering of road, instructions to special agents regarding, 416.
Engineers, number and wages of, 234, 235; number at specified rates of pay, 380.
Engines, steam, number and horsepower of, 328-351; gas, number and horsepower of, 392.
England, style of cars used in, 191.
Eppelsheimer, William, 159.
Equipment, operating expenses of, 72, 73; cost of, 90; electric, number of companies using, 189; miscellaneous, general account of, 189-213; motor and controller, 198; of power houses, 218-229; miscellaneous, 304-327; auxiliary electric, 397; substation, 401; instructions to special agents regarding, 418.
Erie Electric Motor Company, 264, 294, 322, 346, 368, 389.
Erie Railroad Company, effect of electric railway competition on, 117.
Erie Rapid Transit Street Railway Company, 264, 294, 322, 346, 368, 389.
Erie Traction Company, 264, 294, 322, 346, 368, 389.
Escanaba Electric Street Railway Company, 250, 286, 314, 338, 360, 386, 398.
Europe, street railways in, 149-156, 185, 195.
Evansville Electric Railway Company, 242, 280, 308, 332, 356, 398.
Everett Railway and Electric Company, 272, 300, 326, 350, 372, 390, 396, 400.
Exeter, Hampton and Amesbury Street Railway Company, 252, 288, 316, 340, 362, 387, 395, 399, 402.
Expenditures, operating, 10, 11; of lessor companies, 65.
Expenses, operating, 70-79, 85, 105; of maintenance and transportation, 72-74; legal, 74, 75; of salaries and wages of employees, 74, 75; for damages, 74-76; operating, instructions to special agents regarding, 410, 416-421.
Express, cars, 22; traffic on electric lines, nature of, 112; cars, number of, 189; service, development of, 216; receipts from, instructions to special agents regarding, 421.
Fairhaven and Westville Railroad Company, 238, 278, 306, 330, 354, 384, 397.
Fairmont and Clarksburg Electric Railway Company (W. Va.), 272, 300, 326, 350, 372, 396.
Fairmount Park and Haddington Passenger Railway Company, 266.

Fairmount Park Transportation Company, 266, 296, 322, 346, 370, 389, 391, 400.
Fares, prevalence of 5-cent, 39; reduction of, 39-41; comparison with steam railroads, 110; state laws regulating, 130-132, 138-148; registration and collection of, 207, 208.
Farmer, Prof. Moses G., 160.
Farmington Street Railway Company, 238, 278, 306, 330, 354, 384.
Feeder conduit system, description of, 183; length in miles of, 391.
Feeder construction, 183, 184; form of schedule used in census inquiries regarding, 409; instructions to special agents regarding, 415.
Fenders, objections to, 205; types of, 205; total number of cars equipped with, 206; form of schedule used in census inquiries regarding, 408; instructions to special agents regarding, 414, 415.
Field, Stephen D., 161, 162, 169, 170.
Financial operations, statistics of operating and lessor companies, 6; general information regarding, 54-93; method of accounting, 133, 415, 416; statistics of, of railways in specified foreign countries, 149, 151-156.
Firemen, number and wages of, 234, 235, 380, 381.
Fires, frequency of, in electric systems, 197.
Fishkill Electric Railway Company, 256.
Fitchburg and Leominster Street Railway Company, 248, 284, 312, 336, 360, 386.
Fixtures, instructions to special agents regarding, 416, 417.
Flat rail, description of, 174.
Flint and Pere Marquette Railroad Company, effect of electric railway competition on, 117.
Floating debts, purpose of, 44; interest on, 64.
Florida, proportion of passengers to population in, 17; income accounts of companies in, 62-64; earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; woods used for car construction in, 193; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-382; list of companies in, 240; capital stock and funded debt in, 240, 241; character and length of track in, 240, 278; electric construction in, 278; roadbed in, 278; cars, miscellaneous equipment in, 306; power and generating plants in, 330; accidents in, 354; car hours in, 354; car mileage in, 354; maximum speed in, 354; passengers in, 354; bridges and tunnels in, 384; water wheels and gas engines in, 392; alternating-current dynamos in, 394; substation equipment in, 401.
Fond du Lac Street Railway and Light Company, 274, 300, 326, 350, 374, 396.
Fonda, Johnstown and Gloversville Railroad Company, 256, 290, 316, 340, 364, 387.
Foremen, number and wages of, 232, 233.
Fort Dodge Light and Power Company, 242, 282, 310, 334, 356, 394.
Fort Madison Street Railway Company, 242, 282, 310, 334, 356.
Fort Meade Street Railway Company, 240, 278, 306, 330, 354.
Fort Scott Consolidated Supply Company, Street Railway Department, 244, 282, 310, 334, 358.
Fort Smith and Van Buren Light and Transit Company, 236, 276, 304, 328, 352, 384.
Fort Smith Traction, Light and Power Company, 236, 276, 304, 328, 352, 384.
Fort Wayne and Southwestern Traction Company, 242, 280, 308, 332, 356, 385, 394, 398, 401.

Fort Wayne Traction Company, 242, 280, 308, 332, 356, 385.
Framingham, Southboro and Marlboro Street Railway Company, 248.
Framingham Union Street Railway Company, 248, 284, 312, 336, 360.
Forty-second Street and Grand Street Ferry Railway Company, 123, 256.
Forty-second Street, Manhattanville and St. Nicholas Avenue Railway Company, 124, 256, 290, 318, 342, 364.
Fox River Electric Railway and Power Company, 274, 300, 326, 350, 374, 390.
France, statistics of street railways in, 154, 155.
Franchise ordinances, method of obtaining provisions of, by Census Bureau, 126.
Franchise privileges, compensation for, 131, 132.
Franchises, method of granting, 126-128; public regulation of, 126-148; duration of, 128-130; perpetual, 129; state laws regulating, 136-148; in United Kingdom, 150; in Germany, 152.
Frankford and Fairmount Railway Company, 266.
Frankford and Southwark Philadelphia City Passenger Railroad Company, 266.
Frankford and Suburban Railway Company, 244, 282, 310, 334, 358.
Franklin Electric Street Railway Company, 264, 294, 322, 346, 368.
Frederick and Middletown Railway Company, 246, 284, 312, 336, 358, 386.
Frederick City Suburban Railway Company, 246.
Freemansburg Street Railway Company, 262.
Freeport Electric Company, 242, 280, 308, 332, 356.
Freight, mileage of, 22; traffic, 112; cars, number of, 189; service, 216; instructions to special agents regarding, 421.
Fresno City, Belmont and Yosemite Railroad Company, 236, 276, 304, 328, 352.
Fresno Railroad Company, 236, 276, 304, 328, 352.
Fries Manufacturing and Power Company, 258, 292, 318, 342, 366, 388, 393, 395, 402.
Fryeburg Horse Railroad Company, 246, 284, 310, 334, 358.
Fuel, instructions to special agents regarding, 419.
Full-time Electric Surface Railway Companies, income account of, 60, 61; general results of operation of, 86, 88.
Fulton Street Railroad Company, 123, 256, 290, 318, 342, 364.
Funded debt, 64, 80, 90, 91.
Funds, sinking and depreciation, 56.
Galesburg Electric Motor and Power Company, 54, 242, 280, 308, 332, 356, 385.
Galveston Street Railway Company, 270, 298, 324, 348, 372, 390, 396.
Gardiner, E. S., 159.
Gardner, Westminster and Fitchburg Street Railway Company, 248, 284, 312, 336, 360, 386.
Gas engines, 218, 392.
Gearing, 198.
Geary Street, Park and Ocean Railroad Company, 236, 276, 304, 328, 352.
Generating and power plants. *See* Power and generating plants.
Generating equipment, 218.
Generators, alternating current, 221; direct current, 221; form of schedule used in census inquiries regarding, 409; instructions to special agents regarding, 415.
Geneva, Waterloo, Seneca Falls and Cayuga Lake Traction, 256, 290, 316, 342, 364, 388.
Georgetown and Lexington Traction Company (Ky.), 244, 282, 310, 334, 358, 385.

- Georgetown and Tennallytown Railway Company (Washington, D. C.), 238, 278, 306, 330, 354, 384.
- Georgetown, Rawley and Ipswich Street Railway Company (Mass.), 248, 286, 312, 336, 360, 386.
- Georgia, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 137; light-weight T rail in, 179; center pole construction in, 185; woods for car construction in, 193; waterpower used by companies in, 218; wage-earners in, 232-235, 376-383; number of companies in, 232; salaried officials and clerks in, 232; capital stock and funded debt in, 240, 241; list of companies in, 240; character and length of track in, 240, 278; electric construction in, 278; roadbed in, 278; cars and miscellaneous equipment in, 306; power and generating plants in, 330; accidents in, 354; car hours in, 354; car mileage in, 354; maximum speed in, 354; passengers in, 354; bridges and tunnels in, 385; feeder conduit system in, 391; water wheels and gas engines in, 392; alternating-current dynamos in, 394; auxiliary electric equipment in, 397; substation equipment in, 401.
- Georgia Railway and Electric Company, 240, 278, 306, 330, 354, 391, 394, 397, 401.
- Germantown and Fairmount Park Railway Company, 266.
- Germantown Passenger Railway Company, 266.
- Germany, municipal ownership of railways in, 136, 153; franchises in, 152; railways in, 152-154; experiments in high speed and high-pressure current in, 167; styles of cars in, 196.
- Gerry, M. H., 228.
- Gettysburg Transit Company, 264, 294, 322, 346, 368, 389.
- Girard Avenue Passenger Railway Company, 266.
- Girder rail, 179.
- Gloucester and Rockport Street Railway Company, 246.
- Goldsborough, Prof. W. E., 228.
- Grand Junction Street Car System (municipal), 238, 276, 304, 328, 352.
- Grand Rapids, Grand Haven and Muskegon Railway Company, 250, 286, 314, 338, 360, 386, 395, 398, 402.
- Grand Rapids, Holland and Lake Michigan Rapid Railway Company, 250, 286, 314, 338, 360, 386, 395, 398, 402.
- Grand Rapids Railway Company, 250, 286, 314, 338, 360, 386.
- Granite City and St. Louis Railway Company, 242, 280, 308, 332, 356.
- Great Britain and Ireland, municipal ownership of railways in, 136; street railways in, 149-152.
- Great Falls Street Railway Company, 252, 288, 314, 338, 362.
- Green and Coates Streets Philadelphia Passenger Railway Company, 266.
- Green, George F., 166.
- Greenfield and Deerfield Street Railway Company, 248, 284, 312, 336, 360.
- Greenfield and Turners Falls Street Railway Company, 248, 284, 312, 336, 360, 386, 392, 398.
- Greenville Light and Car Company (Miss.), 252, 288, 314, 338, 362.
- Greenville Traction Company (S. C.), 270, 298, 324, 348, 370, 389.
- Greenwich Tramway Company, 238, 278, 306, 330, 354, 384.
- Hagerstown Railway Company, 246, 284, 312, 336, 358, 394.
- Hall, Thomas, 160.
- Hallidie, Andrew S., 159.
- Halske, work of, at Berlin, 161.
- Hamburg Railway Company, 258, 292, 318, 342, 366, 388.
- Hamburg, sliding scale system in, 134.
- Hammond, Whiting and East Chicago Electric Railway Company, 54, 242, 280, 308, 332, 356.
- Hampshire and Worcester Street Railway Company, 250, 286, 312, 336, 360, 386.
- Hampshire Street Railway Company, 250, 286, 312, 336, 360, 386.
- Hand brakes, number of, 203.
- Hannibal Railway and Electric Company, 252, 288, 314, 338, 362, 387.
- Hanover and McSherrystown Street Railway Company, 264, 294, 322, 346, 368.
- Harrisburg and Mechanicsburg Electric Railway Company, 264, 296, 322, 346, 368, 389.
- Harrisburg City Passenger Railway Company, 264.
- Harrisburg Traction Company, 264, 296, 322, 346, 368, 389, 400, 402.
- Hartford and Springfield Street Railway Company, 238, 278, 306, 330, 354, 384.
- Hartford, Manchester and Rockville Tramway Company, 238, 278, 306, 330, 354, 384, 397.
- Hartford Street Railway Company, 238, 278, 306, 330, 354, 384.
- Haverhill and Amesbury Street Railway Company, 248, 284, 312, 336, 360, 386.
- Haverhill and Andover Street Railway Company, 248, 286, 312, 336, 360.
- Haverhill and Southern New Hampshire Street Railway Company, 248, 284, 312, 336, 360.
- Haverhill, Georgetown and Danvers Street Railway Company, 248, 284, 312, 336, 360, 386.
- Hawaii, income accounts of companies in, 63, 64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; capital stock and funded debt of, 274, 275; list of companies in, 274; character and length of track in, 274, 302; electric construction in, 302; roadbed in, 302; cars and miscellaneous equipment in, 326; power and generating plants in, 350; accidents in, 374; car hours in, 374; car mileage in, 374; maximum speed in, 374; passengers in, 374; bridges and tunnels in, 390; alternating-current dynamos in, 396.
- Hawaiian Tramways Company, 274, 302, 326, 350, 374.
- Helena Power and Light Company, 252, 288, 314, 338, 362, 387, 402.
- Henderson Street Railway Company, 244, 282, 310, 334, 358.
- Henry, John C., 164, 165.
- Herrick, A. B., 220.
- Hestonville, Mantua and Fairmount Passenger Railway Company, 125, 266.
- Highland Grove Traction Company, 264, 296, 322, 346, 368.
- Highland Railroad Company, 242, 282, 308, 332, 356, 385.
- Hillcrest Avenue Passenger Railway Company, 266.
- Holmesburg, Tacony and Frankford Electric Railway Company, 266, 296, 322, 346, 370.
- Holyoke Street Railway Company, 248, 284, 312, 336, 360, 386, 394, 398.
- Honolulu Rapid Transit and Land Company, 274, 302, 326, 350, 374, 390.
- Hoosac Valley Street Railway Company, 248, 284, 312, 336, 360, 386, 398.
- Hornellsville and Canisteo Railway Company, 256, 290, 316, 342, 364, 388.
- Hornellsville Electric Railway Company, 256, 290, 316, 342, 364.
- Horse cars. *See* Animal power railways.
- Horses, number of, in use, 305-327.
- Hostlers, number and wages of, 234.
- Hot Springs Street Railroad Company, 236, 276, 304, 328, 352.
- Houghton County Street Railway Company, 250, 286, 314, 338, 360, 386, 395, 398, 402.
- Houston Electric Company (Texas), 270, 298, 324, 348, 372, 390.
- Houston, West Street and Pavonia Ferry line (N. Y.), 123.
- Hovey, Asa E., 159.
- Hudson Valley Railway Company, 182, 212, 254, 290, 316, 340, 364, 387, 392, 399, 402.
- Hungary, street railways in, 155.
- Huntingdon Street Connecting Passenger Railway Company, 266.
- Huntington Railroad Company, 256, 290, 316, 342, 364, 388, 392, 399.
- Huntsville Railway, Light and Power Company, 236, 276, 304, 328, 352, 384, 393.
- Hutchinson Street Railway Company, 244, 282, 310, 334, 358.
- Hyde Park Electric Light Company. *See* Massachusetts Electric Company, 123.
- Idaho, proportion of passengers to population, 17; power consumption in, 226; list of companies in, 240; capital stock and funded debt in, 240, 241; character and length of track in, 240, 278; electric construction in, 278; roadbed in, 278; cars and miscellaneous equipment in, 306; power and generating plants in, 330; accidents in, 354; car hours in, 354; car mileage in, 354; maximum speed in, 354; passengers in, 354; water wheels and gas engines in, 392.
- Illinois, proportion of passengers to population, 17; income accounts of companies in, 62-65; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; interurban railways in, 102, 103; franchise laws in, 137; girder rail in, 179; light-weight T rail in, 179; number of cars in, 189; elevated systems in, 196; hand and air brakes in, 203; car fenders in, 206; car houses in, 209; lights used in companies' buildings in, 211; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 240; capital stock and funded debt in, 240-242; character and length of track in, 240-242, 280; electric construction in, 280; roadbed in, 280; cars and miscellaneous equipment in, 306; power and generating plants in, 330; accidents in, 354; car hours in, 354; car mileage in, 354; maximum speed in, 354; passengers in, 354; bridges and tunnels in, 385; feeder conduit system in, 391; gas engines and water wheels in, 392; alternating-current dynamos in, 394; auxiliary electric equipment in, 397; substation equipment in, 401.
- Inclined planes and surface railways, condensed income account of, 55; percentage distribution of income of, 56; operating expenses of, 77; percentage distribution of operating expenses of, 77; results of operation of, 82; operating ratio of, 84.
- Income, distribution of, 11, 55; general account of, 54; gross, and operating earnings, 55; account of, for operating companies, 55, 56, 59, 62-64; net, 57; account of, for lessor companies, 57, 58, 65; account of, for lessor and operating companies combined, 58, 61, 62, 65; account of, for full-time electric surface companies, 60, 61; from electric light and power plants operated by street railway companies, 229; form of schedule used in census inquiries regarding, 410; instructions to special agents regarding, 421.

- Independence and Rush Park Railway Company, 242, 282, 310, 334, 356.
- Indiana, proportion of passengers to population, 17; income accounts of companies in, 62-64; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; interurban railways in, 102, 103; electric railway mileage in, 102; franchise laws in, 138; light-weight T rail in, 179; number of cars in, 189; car houses in, 209; lights used in companies' buildings in, 211; sleeping cars of interurban lines in, 216; power consumption in, 226; salaried officials and clerks in, 232; number of companies in, 232; wage-earners in, 232-235, 376-383; list of companies in, 242; capital stock and funded debt in, 242-243; character and length of track in, 242, 280; electric construction in, 280; roadbed in, 280; cars and miscellaneous equipment in, 308; power and generating plants in, 332; accidents in, 356; car hours in, 356; car mileage in, 356; maximum speed in, 356; passengers in, 356; bridges and tunnels in, 385; alternating-current dynamos in, 394; auxiliary electric equipment in, 398; substation equipment in, 401.
- Indiana Railway Company, 242, 282, 308, 332, 356, 385, 394, 398.
- Indianapolis, trackage and traffic in, 24; interurban lines in, 103; style and dimensions of cars in, 194.
- Indianapolis and Eastern Railway Company, 242, 280, 308, 332, 356, 385.
- Indianapolis, Shelbyville and Southeastern Traction Company, 242, 280, 308, 332, 356, 385, 394, 398, 401.
- Indianapolis Street Railway Company, 182, 242, 280, 308, 332, 356, 398.
- Indianapolis Traction and Terminal Company, 176.
- Injured, number of, 15, 23, 352-375.
- Inspectors, number and wages of, 232, 233.
- Insurances, expense of, 74, 75; instructions to special agents regarding, 421.
- Interborough Rapid Transit Company, 124, 135, 213.
- Interest and dividends, 79-81, 91; instructions to special agents regarding, 416.
- International Railway Company, 79, 81, 122, 190, 256, 290, 316, 340, 364, 387, 391, 399, 402.
- International Traction Company, 122.
- Interstate Consolidated Street Railway Company, 246, 284, 312, 336, 358.
- Interstate Railways Company, 122.
- Interstate Traction Company, 250, 286, 314, 338, 362.
- Interurban Railway Company, 242, 282, 310, 334, 356, 385, 398, 401.
- Interurban railways, 5, 59-62, 68, 78, 80, 86, 87, 224; percentage of taxes to income for, 66; comparison of, with street and suburban railways, 101; development of, 102; traffic and earnings of, 103, 104; characteristics of service on, 107; advantages of electric power for, 111; local retail business affected by, 112-116; steam railways affected by, 116-119; signal system of, 188; construction and equipment of, 214; styles of passenger cars on, 215; freight and express service on, 216; generating capacity on, 225.
- Interurban Street Railway Company, 4, 52, 79, 81, 122, 124, 189, 209, 211, 256, 290, 318, 342, 364, 388, 391, 395, 399, 402.
- Investments, amount of, 46; instructions to special agents regarding, 416.
- Iola Electric Railroad Company, 244, 282, 310, 334, 358, 385.
- Iowa, proportion of passengers to population in, 17; income accounts of companies in, 62-64; gross earnings in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 139;
- Iowa—Continued.
light-weight T rail in, 179; car lighting in, 206; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 242, 244; capital stock and funded debt in, 242-245; character and length of track in, 242-245, 282; electric construction in, 282; roadbed in, 282; cars and miscellaneous equipment in, 308; power and generating plants in, 332; accidents in, 356; car hours in, 356; car mileage in, 356; maximum speed in, 356; passengers in, 356; bridges and tunnels in, 385; alternating-current dynamos in, 394; auxiliary electric equipment in, 398; substation equipment in, 401.
- Irondequoit Park Railroad Company, 258.
- Italy, street railways in, 156.
- Ithaca Street Railway Company, 256, 290, 316, 342, 364, 388, 392, 395, 399.
- Jackson and Suburban Street Railroad Company, 270, 298, 324, 370, 396.
- Jackson and Suburban Traction Company, 250, 286, 314, 338, 360, 386.
- Jackson Electric Railway, Light, and Power Company, 252, 288, 314, 338, 362, 395.
- Jacksonville Electric Company, 240, 278, 306, 330, 354, 384, 394.
- Jacksonville Railway Company, 242, 280, 308, 332, 356.
- Jamestown Street Railway Company, 256, 290, 316, 342, 364, 388.
- Janesville Street Railway Company, 274, 300, 326, 350, 374, 400.
- Jeffersonville City Railway Company, 242, 280, 308, 332, 356.
- Jersey Central Traction Company, 254, 288, 316, 340, 364, 387.
- Jersey City, trackage and traffic in, 24.
- Jersey City, Hoboken and Paterson Street Railway Company, 79, 254, 288, 316, 340, 364, 387.
- "John Mason" omnibus car, 159.
- John S. Crump Electric Street Railway and Light Plant, 242, 280, 308, 332, 356.
- Johnstown Passenger Railway Company, 264, 296, 322, 346, 368, 389.
- Jointless track, methods of constructing, 178.
- Joints, cast welded, miles of track reporting, by specified states, 178.
- Julien E., 170.
- Kanawha Valley Traction Company, 272, 300, 326, 350, 372.
- Kankakee Electric Railway Company, 242, 280, 308, 332, 356.
- Kansas, proportion of passengers to population in, 17; companies in, failing to report financial transactions, 54; income accounts of companies in, 62-64; gross earnings from operation, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 244; character and length of track in, 244, 282; capital stock and funded debt in, 244, 245; electric construction in, 282; roadbed in, 282; cars and miscellaneous equipment in, 310; power and generating plants in, 334; accidents in, 358; car hours in, 358; car mileage in, 358; maximum speed in, 358; passengers in, 358; bridges and tunnels in, 385; alternating-current dynamos in, 394; auxiliary electric equipment in, 398.
- Kansas City, trackage and traffic in, 24; concrete stringer construction in, 173.
- Kansas City-Leavenworth Railroad Company, 54, 244, 282, 310, 334, 358.
- Keene Electric Railway Company, 252, 288, 316, 340, 362, 387.
- Kensington Railway Company, 246, 284, 312, 336, 358, 386.
- Kentucky, proportion of passengers to population in, 17; income accounts of companies in, 62-64; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; state laws of, regulating local franchises, 139; light-weight T rail in, 179; woods used for car construction in, 193; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 244; character and length of track in, 244, 282; capital stock and funded debt in, 244, 245; roadbed in, 282; electric construction in, 282; cars and miscellaneous equipment in, 310; power and generating plants, 334; accidents in, 358; car hours in, 358; car mileage in, 358; maximum speed in, 358; passengers in, 358; bridges and tunnels in, 385; alternating-current dynamos in, 394; auxiliary electric equipment in, 398.
- Kentucky and Indiana Bridge and Railroad Company, 244, 282, 310, 334, 358.
- Keokuk Electric Railway and Power Company, 244, 282, 310, 334, 356, 394.
- Kessler Street Connecting Passenger Railway Company, 264.
- Key West Electric Company, 240, 278, 306, 330, 354, 394.
- Kickapoo Transit Company, 252, 288, 314, 338, 362.
- Killed on railways, 15, 16, 23, 353-375.
- Kilowatt hours, number of, for railways, 226.
- Kingsbridge Railway Company, 222, 256, 290, 318, 342, 364, 391.
- Kingston Consolidated Railroad Company, 256, 290, 316, 342, 364, 388.
- Kittanning and Ford City Street Railway Company, 264, 296, 322, 346, 368, 389.
- Knight, Walter H., 164.
- Knoxville Traction Company, 270, 298, 324, 348, 370, 389, 396.
- Kokomo Railway and Light Company, 242, 280, 308, 332, 356, 385.
- La Crosse and Onalaska Street Railway Company, 274, 300, 326, 350, 374.
- La Crosse City Railway Company, 274, 300, 326, 350, 374, 390.
- Lackawanna Valley Traction Company, 268.
- Laconia Street Railway Company, 252, 288, 316, 340, 362, 399.
- Lafayette Street Railway Company, 242, 280, 308, 332, 356, 385.
- Lake Charles Street Railway Company, 244, 282, 310, 334, 358.
- Lake Cities Electric Railway Company, 242, 282, 308, 332, 356.
- Lake Erie and Western Railroad Company, effect of electric railway competition on, 117.
- Lake Ontario and Riverside Railroad Company, 256, 290, 316, 342, 364.
- Lake Park Street Railroad Company, 270, 298, 324, 348, 372.
- Lake Shore and Michigan Southern Railroad Company, effect of electric railway competition on, 117.
- Lake Shore Electric Railway Company, 103, 216, 260, 294, 320, 344, 368, 388, 396, 399, 402.
- Lake Street Elevated Railroad Company (includes Chicago and Harlem Railroad), 179, 196, 240, 280, 308, 332, 356, 385, 397, 401.
- Lamp trimmers, number and wages of, 235.
- Lamps, number and kinds of, 305-327.
- Lancaster and Columbia Railway Company, 264.
- Lancaster, Mechanicsburg and New Holland Railway Company, 264.
- Lancaster, Petersburg and Manheim Railway Company, 264.

- Lancaster Traction Company (Ohio), 260, 294, 320, 344, 366, 393.
- Lancaster, Willow Street, Lampeter and Strasburg Railway Company, 264.
- Land, value of, affected by street railways, 30; rent of, instructions to special agents regarding, 421.
- Lansdale and Norristown Electric Railway Company, 264, 296, 322, 346, 368, 389.
- Lansing City Electric Railway Company, 250, 286, 314, 338, 360.
- Lansingburg and Cohoes Railroad Company, 254.
- Laredo Electric and Railway Company, 270, 298, 324, 348, 372.
- Lawrence and Methuen Street Railway Company, 248, 284, 312, 336, 360.
- Lawrence and Reading Street Railway Company, 248, 284, 312, 336, 360, 386.
- Lebanon Valley Street Railway Company, 264, 296, 322, 346, 368, 389.
- Legal expenses, percentage distribution of, 76; instructions to special agents regarding, 420, 421.
- Legislation, direct, movement in favor of, in granting franchises, 127.
- Lehigh Avenue Railway Company, 266.
- Lehigh Traction Company, 264, 296, 322, 346, 368, 389.
- Lehigh Valley Railroad Company, effect of electric railway competition on, 117.
- Lehigh Valley Traction Company, 262, 294, 320, 344, 368, 389, 400.
- Lessor companies, securities of, 46; income account for, 57, 58, 61, 62, 65; rentals of, 66; interest and dividends of, 80; assets and liabilities of, 90, 91.
- Lewisburg, Milton and Watertown Passenger Railway Company, 264, 296, 322, 346, 368, 389.
- Lewiston and Youngstown Frontier Railway Company (N. Y.), 256, 290, 316, 342, 364.
- Lewiston, Brunswick and Bath Street Railway Company (Me.), 246, 284, 310, 334, 358, 386, 394, 398, 401.
- Lewistown and Reedsville Electric Railway Company, 264, 296, 322, 346, 368, 389.
- Lexington and Boston Street Railway Company (Mass.), 246, 284, 312, 336, 358, 386, 398.
- Lexington Avenue and Pavonia Ferry Company (N. Y.), 123.
- Lexington Railway Company (Ky.), 244, 282, 310, 334, 358, 385, 394.
- Liabilities. *See* Assets and liabilities.
- Licenses, car, issuing of, how regulated, 131.
- Light and power plants, revenue from, 45.
- Lighting, of cars, 206; of buildings, methods employed in, 211; form of schedule used in census inquiries regarding, 408; instructions to special agents, 415.
- Lima Electric Railway and Light Company (Ohio), 260, 294, 320, 344, 366.
- Lima-Honeoye Electric Light and Railroad Company, 256, 290, 316, 342, 364, 388, 395.
- Lincoln Street Car Company (Ill.), 242, 280, 308, 332, 356.
- Lincoln Traction Company (Nebr.), 252, 288, 314, 340, 362, 387, 395.
- Line supports, 182, 183.
- Linemen, number and wages of, 234.
- Linwood Street Railway Company, 250, 286, 312, 338, 360.
- Little Rock Traction and Electric Company, 236, 276, 304, 328, 352, 384.
- Logansport Railway Company, 242, 280, 308, 332, 356.
- Logansport, Rochester and Northern Traction Company, 242, 280, 308, 332, 356.
- London, conduit system in, 181.
- Long Island Railroad, electric service introduced on branch system of, 118.
- Longview and Junction Railway Company, 270, 298, 324, 348, 372.
- Lorain Street Railway Company, 260, 294, 320, 344, 366, 388.
- Los Angeles, Cal., trackage and traffic in, 24.
- Los Angeles and Pasadena Railway Company, 236, 276, 304, 328, 352, 384, 392, 397, 401.
- Los Angeles Electric Incline Railway, 236, 276, 304, 328, 352.
- Los Angeles, Pacific Railroad Company, 182, 236, 276, 304, 328, 352, 397.
- Los Angeles Railway Company, 181, 236, 276, 304, 328, 352, 384.
- Los Angeles Traction Company, 94, 236, 276, 304, 328, 352.
- Louisiana, proportion of passengers to population, 17; income accounts of companies in, 62-64; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; state laws of, regulating local franchises, 139; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 244; capital stock and funded debt in, 244, 245; character and length of track in, 244, 282; electric construction in, 282; roadbed in, 282; cars and miscellaneous equipment in, 310; power and generating plants in, 334; accidents in, 358; car hours in, 358; car mileage in, 358; maximum speed in, 358; passengers in, 358; bridges and tunnels in, 385; alternating-current dynamos in, 394; auxiliary electric equipment in, 398.
- Louisville, trackage and traffic in, 24.
- Louisville, Anchorage and Pewee Valley Electric Railway Company, 244, 282, 310, 334, 358, 385.
- Louisville Railway Company, 81, 244, 282, 310, 334, 358, 398.
- Lowell and Boston Street Railway, 248, 284, 312, 336, 360, 386.
- Lubricants for power plants, expenditures for, instructions to special agents regarding, 419.
- Lykens and Williams Valley Street Railway Company, 264, 296, 322, 346, 368, 389.
- Lynchburg Traction and Light Company, 272, 300, 324, 350, 372, 393, 396.
- Machinery, instructions to special agents regarding, 416.
- Macon Railway and Light Company, 240, 278, 306, 330, 354, 385, 394.
- Madison Light and Railway Company (Ind.), 242, 282, 308, 332, 356, 394.
- Madison Traction Company (Wis.), 274, 300, 326, 350, 374, 390.
- Mahoning Valley Railway Company, 217, 262, 294, 320, 344, 368, 388, 399.
- Mail cars, 22, 189; instructions to special agents regarding, 421.
- Mailloux, C. O., 162, 170.
- Maine, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; electric railway mileage in, 102; interurban railways in, 102; franchise laws in, 140; side bracket construction in, 182; waterpower used in, 218; power consumption in, 226; wage-earners in, 232-235, 376-383; number of companies in, 232; salaried officials and clerks in, 232; list of companies in, 244, 246; capital stock and funded debt in, 244-246; character and length of track in, 244, 284; electric construction in, 284; roadbed in, 284; cars and miscellaneous equipment in, 310; power and generating plants in, 334; accidents in, 358; car hours in, 358; car mileage in, 358; maximum speed in, 358; passengers in, 358; bridges and tunnels in, 385; water wheels and gas engines in, 392; alternating-current dynamos in, 394; auxiliary electric equipment in, 398; substation equipment in, 401; form of schedule used in census inquiries regarding, 409.
- Mains, instructions to special agents regarding, 415.
- Maintenance, operating expenses of, 72, 73, 76.
- Managers, number and salaries of, 232.
- Manchester Street Railway Company, 254, 288, 316, 340, 362, 387.
- Manhattan Elevated Railway Company, 22, 77, 81, 84, 179, 196, 197, 201, 211, 223, 228, 258, 290, 318, 342, 364, 391, 395, 399, 402.
- Manistee, Filer City and Eastlake Railway Company, 250, 286, 314, 338, 360, 398.
- Manitou Electric Railway and Casino Company, 238.
- Manitowoc and Northern Traction Company, 274, 300, 326, 350, 374, 390.
- Mansfield Electric Railway, Light and Power Company, 260, 294, 320, 344, 366, 388, 396, 399.
- Manufacturers Railroad Company, 238, 278, 306, 330, 354.
- Marinette Gas, Electric Light and Street Railway Company, 274, 300, 326, 350, 374, 390, 396.
- Marion Street Railway Company, 260, 294, 320, 344, 366.
- Marlboro and Westboro Street Railway Company, 248, 284, 312, 336, 360, 398.
- Marlboro Street Railway Company, 248, 284, 312, 336, 360.
- Marquette City and Presque Isle Railway Company, 250, 286, 314, 338, 362, 386.
- Marshalltown Light, Power and Railway Company, 244, 282, 310, 334, 356, 394, 398.
- Marthas Vineyard Street Railway Company, 250, 286, 312, 336, 360, 386.
- Maryland, proportion of passengers to population in, 17; capitalization in, 51; income accounts of companies in, 62-64; percentage of taxes to income in, 66; earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 140; girder rails in, 179; center pole construction in, 182; power consumption in, 225, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 246; capital stock and funded debt in, 246, 247; character and length of track in, 246, 284; electric construction in, 284; roadbed in, 284; cars and miscellaneous equipment of, 312; power and generating plants in, 336; accidents in, 358; car hours in, 358; car mileage in, 358; maximum speed in, 358; passengers in, 358; bridges and tunnels in, 386; alternating-current dynamos in, 394; auxiliary electric equipment in, 398; substation equipment in, 401.
- Marysville and Yuba City Street Railroad Company, 236, 276, 304, 328, 352.
- Mason City and Clear Lake Traction Company, 244, 282, 310, 334, 356, 385.
- Massachusetts, proportion of passengers to population in, 17; companies failing to report financial transactions in, 54; income accounts of companies in, 62-65; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; continuity of street railways in, 102; number and speed of trolley cars in, 102; number of electric companies in, 123; authority of railroad commission in, 126; franchise laws in, 129, 140, 141; capitalization in, 133; fares in, 141; girder rail in, 179; third-

Massachusetts—Continued.

rail construction in, 179; side bracket construction in, 182; span wire construction in, 182; pole construction in, 182; number of cars in, 189; hand and air brakes in, 203; car lighting in, 206; car fenders in, 206; car houses in, 209; lighting of buildings in, 211; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; capital stock and funded debt in, 246-250; character and length of track in, 246-250, 284-286; list of companies in, 246-250; electric construction in, 284; roadbed in, 284; cars and miscellaneous equipment in, 312; power and generating plants in, 336; accidents in, 358-360; car hours in, 358-360; car mileage in, 358-360; maximum speed in, 358-360; passengers in, 358-360; bridges and tunnels in, 386; feeder conduit system in, 391; water wheels and gas engines in, 392; alternating-current dynamos in, 394; auxiliary electric equipment in, 398; substation equipment in, 401.

Massachusetts Electric Companies, 123.

Mauch Chunk, Lehigh and Slatington Street Railway Company, 264, 296, 322, 346, 368, 393.

Maysville Street Railroad and Transfer Company, 244, 282, 310, 334, 358, 385.

Meadville Traction Company, 264, 296, 322, 346, 368, 389, 400.

Mechanics, number and wages of, 235, 382.

Mechanicsburg and Buffalo Street Railway Company, 240, 280, 308, 332, 354.

Medfield and Medway Street Railway Company, 248, 284, 312, 336, 360, 386.

Media, Glen Riddle and Rockdale Electric Railway Company (lessor), 266.

Media, Middletown, Aston and Chester Electric Railway Company (including Philadelphia, Morton and Swarthmore Street Passenger Railway Company), 262, 294, 320, 346, 368, 389.

Median rate of pay of wage-earners, 376, 377.

Memphis, Tenn., trackage and traffic in, 24.

Memphis Street Railway Company, 270, 298, 324, 348, 370, 389, 400.

Menominee Electric Light, Railway and Power Company, 250, 286, 314, 338, 362, 395, 398.

Meriden Electric Railroad Company, 238, 278, 306, 330, 354.

Meriden, Southington and Compounce Tramway Company, 238, 278, 306, 330, 354, 384.

Meridian Light and Railway Company, 252, 288, 314, 338, 362, 387, 395.

Merrill Railway and Lighting Company, 274, 300, 326, 350, 374, 393, 400.

Metropolitan Cable Railway Company (Nebr.), 252, 288, 314, 340, 362.

Metropolitan Crosstown Company, 123.

Metropolitan Railroad Company (D. C.), 180, 238, 278, 306, 330, 354, 391, 397.

Metropolitan Street Railway Company (Mo.), 46, 81, 252, 288, 314, 338, 362, 387, 399.

Metropolitan Street Railway Company (N. Y.), 122, 123, 190, 256.

Metropolitan Traction Company (N. Y.), 123, 124.

Metropolitan West Side Elevated Railway Company (Ill.), 82, 179, 196, 212, 240, 280, 308, 332, 356, 385.

Michigan, proportion of passengers to population in, 17; income accounts of companies in, 62-64; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; interurban railways in, 102, 103; competition of interurban with steam railways in, 103; connection of electric lines in, 103; fares in, 142; franchise laws in, 142; third-rail construction in, 179; number of cars in, 189; car houses in, 209; lights used in companies'

Michigan—Continued.

buildings in, 211; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 250; capital stock and funded debt in, 250, 251; character and length of track in, 250, 286; electric construction in, 286; roadbed in, 286; cars and miscellaneous equipment in, 314; power and generating plants in, 338; accidents in, 362; car hours in, 362; car mileage in, 360; maximum speed of cars in, 362; passengers in, 360; bridges and tunnels in, 386; feeder conduit system in, 391; alternating-current dynamos in, 395; auxiliary electric equipment in, 398; substation equipment in, 402.

Michigan Traction Company, 250, 286, 314, 338, 360, 386, 398, 402.

Middleboro, Wareham, and Buzzards Bay Street Railway Company, 248, 284, 312, 336, 360, 386.

Middlesex and Somerset Traction Company, 254, 288, 316, 340, 364, 399, 402.

Middleton and Danvers Street Railway Company, 248, 284, 312, 336, 360, 386.

Middletown-Goshen Electric Railway Company (N. Y.), 256, 290, 316, 342, 364, 388.

Middletown, Highspire and Steelton Street Railway Company (Pa.), 264.

Middletown Street Railway Company (Conn.), 238, 278, 306, 330, 354.

Mileage, track, comparative summary of, by motive power, 8; car, bases for computing, 14; car, classified by power, 14; car, classified by population, 21; freight, mail, express, and miscellaneous cars, classified by population, 22; single track, by classes of railways, 172; instructions to special agents regarding, 414; car, by companies and states, 352-375.

Milford and Uxbridge Street Railway Company (including Milford, Holliston and Framingham Street Railway Company), 248, 284, 312, 336, 360, 386, 394, 398, 401.

Milford, Attleboro and Woonsocket Street Railway Company, 248, 284, 312, 336, 360, 386.

Military Post Street Railway Company, 272, 298, 324, 348, 372.

Mill Creek Valley Street Railroad Company, 260, 292, 318, 344, 366, 388, 399.

Millville Traction Company, 254, 288, 316, 340, 364, 387.

Milwaukee, regulation of fares in, 148; style and dimensions of cars in, 193, 194.

Milwaukee Electric Railway and Light Company, 82, 176, 274, 300, 326, 350, 374, 391, 396, 400, 403.

Milwaukee Light, Heat, and Traction Company, 274, 300, 326, 350, 374, 390, 391, 396, 403.

Minneapolis-St. Paul system, 189.

Minnesota, proportion of passengers to population in, 17; income account of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities in, 90, 91; franchise laws in, 142; miles of track reporting cast welded joints in, 178; number of cars in, 189; car lighting in, 206; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 250; capital stock and funded debt in, 250, 251; character and length of track in, 250, 286; electric construction in, 286; roadbed in, 286; cars and miscellaneous equipment in, 314; power and generating plants in, 338; accidents in, 362; car hours in, 362; car mileage in, 362; maximum speed in, 362; passengers in, 362; bridges and tunnels in, 387; length of feeder conduit system in, 391; water

Minnesota—Continued.

wheels and gas engines in, 392; alternating-current dynamos in, 395; auxiliary electric equipment in, 399; substation equipment in, 402.

Mississippi, proportion of passengers to population in, 17; income accounts of companies in, 62-64; gross earnings from operations in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; woods used for car construction in, 193; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 252; capital stock and funded debt in, 252, 253; character and length of track in, 252, 288; electric construction in, 288; roadbed in, 288; cars and miscellaneous equipment in, 314; power and generating plants in, 338; accidents in, 362; car hours in, 362; car mileage in, 362; maximum speed in, 362; passengers in, 362; bridges and tunnels in, 387; alternating-current dynamos in, 395.

Missouri, proportion of passengers to population in, 17; capitalization in, 51; income accounts of companies in, 63, 64, 66; earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 143; miles of track reporting cast welded joints in, 178; girder rails in, 179; number of cars in, 189; car houses in, 209; lights used in companies' buildings in, 211; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; capital stock and funded debt in, 251, 252; list of companies in, 252; character and length of track in, 252, 288; electric construction in, 288; roadbed in, 288; cars and miscellaneous equipment in, 314; power and generating plants in, 338; accidents in, 362; car hours in, 362; car mileage in, 362; maximum speed in, 362; passengers in, 362; bridges and tunnels in, 387; length of feeder conduit system in, 391; alternating-current dynamos in, 395; auxiliary electric equipment in, 399.

Missouri Water, Light, and Traction Company, 252, 288, 314, 338, 362, 387, 395.

Mobile Light and Railroad Company, 236, 276, 304, 328, 352, 384, 393, 397.

Monmouth County Electric Company, 254, 288, 316, 340, 364, 387.

Monongahela Incline Plane Company, 268, 296, 322, 346, 370.

Monongahela Street Railway Company, 266.

Monrovia Street Railway Company, 236, 276, 304, 328, 352.

Montana, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; power consumption in, 226; number of electric companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 252; capital stock and funded debt in, 252, 253; character and length of track in, 252, 288; electric construction in, 288; roadbed in, 288; cars and miscellaneous equipment in, 314; power and generating plants in, 338; accidents in, 362; car hours in, 362; car mileage in, 362; maximum speed in, 362; passengers in, 362; bridges and tunnels in, 387; water wheels and gas engines in, 392; substation equipment in, 402.

Monterey and Pacific Grove Street Railway Company, 236, 276, 304, 328, 352.

Montgomery, Ala., relation of trackage and traffic to population in, 19.

Montgomery and Chester Electric Railway Company (Pa.), 266, 296, 322, 346, 370, 389.

- Montgomery County Passenger Railway Company (Pa.), 264.
- Montgomery Street Railway Company (Ala.), 236, 276, 304, 328, 352.
- Montoursville Passenger Railway Company, 264, 296, 322, 346, 368.
- Montville Street Railway Company, 238, 278, 306, 330, 354, 384, 397.
- Motor suspension, methods of, 167-169.
- Motormen, proportion of all wage-earners to, 94; number and rates of pay of, 232, 233, 378; instructions to special agents regarding, 419.
- Motors, electric, improvements in, 198, 199; number of, per car, 200.
- Mt. Holly Street Railway Company, 254, 288, 316, 340, 364.
- Mt. Mansfield Electric Railway Company, 272, 298, 324, 348, 372, 390.
- Mt. Oliver Incline Railway Company, 266.
- Mt. Penn Gravity Railway Company, 268, 296, 322, 346, 370.
- Mt. Tom Railroad Company, 248.
- Mt. Vernon Electric Railway Company, 260, 294, 320, 344, 366.
- Mountain Lake Electric Railroad Company, 256, 290, 316, 342, 364, 388.
- Mousam River Railroad Company, 246.
- Multiple Unit System, advantage of, 200; description of, 201.
- Municipal ownership, discussion of, 135, 136; of street railways in specified foreign countries, 150, 153.
- Murphysboro Street Railway Company, 242, 280, 308, 332, 356.
- Muskegon Traction and Lighting Company, 250, 286, 314, 338, 362, 386, 395.
- Myersville and Catocin Railway Company, 246.
- Nashua Street Railway Company, 246, 254.
- Nashville Railway Company, 270, 298, 324, 348, 370, 389.
- Natchez Electric Street Railway and Power Company, 252, 288, 314, 338, 362.
- Natick and Cochituate Street Railway Company, 248, 286, 312, 336, 360.
- Natick and Needham Street Railway Company, 248.
- Nebraska, proportion of passengers to population in, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 252, 253; character and length of track in, 252, 288; electric construction in, 288; roadbed in, 288; cars and miscellaneous equipment in, 314; power and generating plants in, 340; accidents in, 362; car hours in, 362; car mileage in, 362; maximum speed in, 362; passengers in, 362; bridges and tunnels in, 387; alternating-current dynamos in, 395.
- Nebraska City Railway Company, 252, 288, 314, 340, 362.
- Negaunee and Ishpeming Street Railway and Electric Company, 250, 286, 314, 338, 360, 386, 395, 398.
- Netherlands, street railways in, 156.
- Nevada County Traction Company, 236, 276, 304, 328, 352, 397.
- Neversink Mountain Railroad Company, 268, 296, 322, 346, 370, 389.
- New Albany Street Railroad Company, 242, 282, 308, 332, 356.
- New Bedford and Onset Street Railway Company, 248, 286, 312, 336, 360, 386.
- New Castle and Lowell Railway Company, 264, 296, 322, 346, 368.
- New Castle Traction Company, 264, 296, 322, 346, 368.
- New England, companies chartered by legislative acts in, 126.
- New Hampshire, proportion of passengers to population in, 17; income accounts of companies in, 62-65; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; interurban railways in, 102; power consumption in, 226; number of companies in, 232-235; salaried officials and clerks in, 232-235; wage-earners in, 232-235, 376-383; list of companies in, 252, 254; capital stock and funded debt in, 252-255; character and length of track in, 252, 288; electric construction in, 288; roadbed in, 288; cars and miscellaneous equipment in, 316; power and generating plants in, 340; accidents in, 362; car hours in, 362; car mileage in, 362; maximum speed in, 362; passengers in, 362; bridges and tunnels in, 387; alternating-current dynamos in, 395; auxiliary electric equipment in, 399; substation equipment in, 402.
- New Homestead Street Railway Company, 266.
- New Jersey, proportion of passengers to population in, 17; capitalization in, 51, 53; income accounts of companies in, 62-66; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 143; girder rail in, 179; number of cars in, 189; car lighting in, 206; car houses in, 209; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 254; capital stock and funded debt in, 254, 255; character and length of track in, 254, 288; electric construction in, 288; roadbed in, 288; cars and miscellaneous equipment in, 316; power and generating plants in, 340; accidents in, 362-365; car hours in, 362-365; car mileage in, 362-365; maximum speed in, 362-365; passengers in, 362-365; bridges and tunnels in, 387; feeder conduit system in, 391; alternating-current dynamos in, 395; auxiliary electric equipment in, 399; substation equipment in, 402.
- New Jersey and Hudson River Railway and Ferry Company, 186, 254, 288, 316, 340, 362, 387, 391, 399.
- New London Street Railway Company, 238, 278, 306, 330, 354.
- New Mexico, proportion of passengers to population in, 17; list of companies in, 254; capital stock and funded debt in, 254, 255; character and length of track in, 254, 290; electric construction in, 290; roadbed in, 290; cars and miscellaneous equipment in, 316; power and generating plants in, 340; accidents in, 364; car hours in, 364; car mileage in, 364; maximum speed in, 364; passengers in, 364.
- New Orleans, trackage and traffic in, 24.
- New Orleans and Carrollton Railroad Light and Power Company, 244, 282, 310, 334, 358.
- New Orleans Railways Company, 244, 282, 310, 334, 358, 398.
- New Paltz and Poughkeepsie Traction Company, 256, 290, 318, 342, 364, 388.
- New York city, trackage and traffic in, 24; street railway consolidation in, 123; franchise regulations in, 127; third-rail construction in, 179; description of tunnel in, 187.
- New York state, proportion of passengers to population in, 17; capitalization in, 51; income accounts of companies in, 62-66; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; interurban railways in, 102; franchise laws in, 143, 144; girder rail in, 179; third-rail construction in, 179; pole construction in, 182, 183; feeder construction in, 183; number of cars in, 189, 190; hand and air brakes in, 203; car fenders in, 206; car houses in, 209; waterpower used by companies in, 218; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 254, 256, 258; capital stock and funded debt in, 254-259; character and length of track in, 254, 290-293; electric construction in, 290; roadbed in, 290-293; cars and miscellaneous equipment in, 316-319; power and generating plants in, 340-343; accidents in, 364-367; car hours in, 364-367; car mileage in, 364-367; maximum speed in, 364-367; passengers in, 364-367; bridges and tunnels in, 387, 388; feeder conduit system in, 391; water wheels and gas engines in, 392; alternating-current dynamos in, 395; auxiliary electric equipment in, 399; substation equipment in, 402.
- New York and Harlem (city line) Railroad Company, 123, 256.
- New York and Long Island Traction Company, 256, 290, 316, 342, 364, 388, 402.
- New York and North Shore Railway Company, 258, 292, 318, 342, 364, 388.
- New York and Queens County Railway Company, 258, 292, 318, 342, 364, 388, 399.
- New York and Stamford Railway Company, 258, 292, 318, 342, 366, 388.
- New York Central and Hudson River Railroad Company, 3, 188.
- New York, Chicago and St. Louis Railroad Company, 117.
- New York, New Haven and Hartford Railroad Company, 3, 117, 118, 179.
- Berlin System (Conn.), 54, 238, 278, 306, 330, 354, 397.
- Nantasket System (Mass.), 54, 248, 284, 312, 336, 360.
- New Canaan Branch (Conn.), 54, 238, 278, 306, 330, 354.
- Providence, Warren and Bristol Branch (R. I.), 54, 270, 296, 322, 348, 370, 400.
- Newark (Ohio), description of car house in, 210.
- Newark and Granville Street Railway Company (Ohio), 260, 294, 320, 344, 366.
- Newark and Hackensack Traction Company (N. J.), 254, 290, 316, 340, 364.
- Newport and Fall River Street Railway Company, 246, 268.
- Newport News and Old Point Railway and Electric Company, 272, 300, 324, 350, 372, 390, 396, 400.
- Newton and Boston Street Railway Company (Mass.), 248, 286, 312, 336, 360, 398.
- Newton, Langhorne and Bristol Trolley Street Railway Company (Pa.), 262.
- Newton, Street Railway Company (Mass.), 248, 286, 312, 336, 360.
- Newtonville and Watertown Street Railway Company, 248.
- Newtown Electric Street Railway Company, 262, 294, 320, 346, 368, 389, 396, 402.
- Niagara Falls, power obtained from, 218.
- Niagara Gorge Railroad Company, 258, 292, 318, 342, 366, 388.
- Ninth Avenue Railroad Company, 123, 256.
- Norfolk and Atlantic Terminal Company (Va.), 272, 300, 324, 350, 372, 390.
- Norfolk and Bristol Street Railway Company (Mass.), 248, 284, 312, 336, 360, 386.
- Norfolk, Portsmouth and Newport News Company (Va.), 272, 300, 326, 350, 372, 390.

- Norfolk Railway and Light Company (Va.), 272, 300, 324, 350, 372, 390, 396, 400.
- Norfolk Western Street Railway Company (Mass.), 248, 284, 312, 336, 360, 398, 401.
- North Atlantic division, relation of traffic to population in, 9.
- North Augusta Electric and Improvement Company, 240, 270, 298, 324, 348, 370.
- North Carolina, proportion of passengers to population in, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; salaried officials and clerks in, 232; number of companies in, 232; wage-earners in, 232-235, 376-383; character and length of track in, 258, 292; list of companies in, 258; capital stock and funded debt in, 258, 259; electric construction in, 292; roadbed in, 292; cars and miscellaneous equipment in, 318; power and generating plants in, 342; accidents in, 366; car mileage in, 366; maximum speed in, 366; passengers in, 366; bridges and tunnels in, 388; water wheels and gas engines in, 392; alternating-current dynamos in, 395; auxiliary electric equipment in, 399; substation equipment in, 402.
- North Central division, relation of traffic to population, 9.
- North Chicago City Railway Company, 240.
- North Chicago Street Railroad Company, 240.
- North End Street Railway Company, 250.
- North Jersey Street Railway Company, 79, 212, 254, 288, 316, 340, 364, 387, 391, 399.
- North Kankakee Electric Light and Railway Company, 242, 280, 308, 332, 356.
- North Shore Railroad Company, 215.
- Northampton and Amherst Street Railway Company (Mass.), 248, 286, 312, 336, 360, 386.
- Northampton Central Street Railway Company (Pa.), 262.
- Northampton Street Railway Company (Mass.), 248, 286, 312, 336, 360, 386.
- Northern Electric Railway Company, 240, 280, 308, 332, 356.
- Northern Ohio Traction Company, 260, 292, 320, 344, 366, 388, 395.
- Northern Pacific Railway (branch system of), electric service introduced on, 119.
- Northern Passenger Railway Company, 266.
- Northern Railway and Improvement Company, 272, 300, 326, 350, 372, 390, 396, 400.
- Northern Texas Traction Company, 216, 270, 298, 324, 348, 372, 390, 396, 400, 403.
- Northport Traction Company, 258, 292, 318, 342, 366.
- Northwestern Elevated Railroad Company, 179, 196, 240, 280, 308, 332, 356.
- Norristown Passenger Railway Company, 264.
- Norton and Taunton Street Railway Company, 248, 286, 312, 336, 360, 386.
- Norway and Paris Street Railway Company, 246, 284, 310, 334, 358.
- Norwich Street Railway Company, 238, 278, 306, 330, 354.
- Norwood, Canton and Sharon Street Railway Company, 248, 286, 312, 336, 360, 386.
- Oakland Transit Consolidated Railway Company, 181, 236, 276, 304, 328, 352, 384.
- Oakwood Street Railway Company, 260, 294, 320, 344, 366, 399.
- Ocean City Electric Railroad Company, 254, 288, 316, 340, 364.
- Ocean Electric Railway Company, 256, 290, 316, 340, 364.
- Officers, general, salaries of, 232; instruction to special agents regarding, 420.
- Ogden Rapid Transit Company, 270, 298, 324, 348, 372, 390.
- Ogdensburg Street Railway Company, 258, 292, 318, 342, 366, 392.
- Ohio, proportion of passengers to population in, 17; companies failing to report financial transactions in, 54; income accounts of companies in, 62-66; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; electric railway mileage in, 102; interurban railways in, 102, 103; electric lines in, 103; franchise laws in, 144, 145; girder rail in, 179; side bracket construction in, 182; span wire construction in, 182; line supports in, 183; number of cars in, 189; air brakes in, 203; car lighting in, 206; car houses in, 209; lights used in companies' buildings in, 211; sleeping cars in, 216; power consumption in, 226; number of companies in, 232; salaried officials and clerks of, 232; wage-earners in, 232-235, 376-383; list of companies in, 260, 262; capital stock and funded debt in, 260-263; character and length of track in, 260, 292; electric construction in, 292-295; roadbed in, 292-295; cars and miscellaneous equipment in, 318-321; power and generating plants in, 344; accidents in, 366-369; car hours in, 366-369; car mileage in, 366-369; maximum speed in, 366-369; passengers in, 366-369; bridges and tunnels in, 388; feeder-conduit system in, 391; water wheels and gas engines in, 393; alternating-current dynamos in, 395, 396; auxiliary electric equipment in, 399; substation equipment in, 402.
- Ohio Central Traction Company, 260, 292, 318, 344, 366, 388.
- Ohio River Electric Railway and Power Company, 260, 294, 320, 344, 368, 388.
- Oil City Station Railway Company, 264.
- Oil City Street Railway Company, 264, 296, 322, 346, 368.
- Old Colony Street Railway Company, 81, 123, 182, 209, 284, 312, 336, 358, 386, 391, 394, 398.
- Old Dominion Railway Company, 54, 272, 300, 326, 350, 372, 390.
- Olean, Rock City and Bradford Railroad Company, 258, 292, 318, 342, 366, 388, 399.
- Olean Street Railway Company, 258, 292, 318, 342, 366, 388.
- Olympia Light and Power Company, 272, 300, 326, 350, 372, 390, 393, 396, 400.
- Omaha, span wire construction in, 182.
- Omaha and Council Bluffs Railway and Bridge Company (Iowa), 242, 282, 308, 334, 356, 385.
- Omaha Street Railway Company (Nebr.), 81, 252, 288, 314, 340, 362.
- Oneida Railway Company, 258, 292, 318, 342, 366.
- Oneonta, Cooperstown and Richfield Springs Railway Company, 258, 292, 318, 342, 366, 388, 399.
- Ontario and San Antonio Heights Railway Company (Cal.), 236, 276, 304, 328, 352, 384, 392, 393, 397.
- Ontario Light and Traction Company (N. Y.), 256, 290, 316, 340, 364, 392, 395, 399.
- Operating companies, comparative number of, 67; increase in, 7; comparative size of, 7; income account for, 55-66; interest and dividends of, 80-82; assets and liabilities of, 90, 91; distribution of, 121.
- Operating earnings of companies, 66-70.
- Operating expenses of companies, 63, 72-79, 85.
- Operating ratios in urban and interurban groups, 87, 88.
- Orange and Passaic Valley Traction Company (N. J.), 254, 288, 316, 340, 364, 387.
- Orange County Traction Company (N. Y.), 256, 290, 318, 342, 364, 388.
- Orange Mountain Traction Company (N. J.), 254, 290, 316, 340, 364.
- Orangeburg City Street Railway Company, 270, 298, 324, 348, 370.
- Oregon, proportion of passengers to population in, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; franchise laws in, 145, 146; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; capital stock and funded debt in, 262, 263; character and length of track in, 262, 294; electric construction in, 294; list of companies in, 294; roadbed in, 294; cars and miscellaneous equipment in, 320; power and generating plants in, 344; accidents in, 368; car hours in, 368; car mileage in, 368; maximum speed in, 368; passengers in, 368; bridges and tunnels in, 388; alternating-current dynamos in, 396; auxiliary electric equipment in, 400.
- Orleans Railroad Company, 244, 282, 310, 334, 358.
- Oswego Traction Company, 258, 292, 318, 342, 366, 388, 399.
- Ottawa Railway, Light and Power Company, 242, 280, 308, 332, 356, 385, 392, 394.
- Ottumwa Traction and Light Company, 244, 282, 310, 334, 356, 394, 398.
- Owensboro City Railroad Company, 244, 282, 310, 334, 358.
- Owners of abutting property, 127.
- Owosso and Corunna Electric Company, 250, 286, 314, 338, 362, 395.
- Pacific Electric Railway Company, 236, 276, 304, 328, 352.
- Pacific Heights Electric Railway Company, 274, 302, 326, 350, 374, 390, 396.
- Paducah City Railway Company, 244, 282, 310, 334, 358, 385, 394, 398.
- Page, Prof. C. J., 160, 161.
- Palatka and Heights Street Railway Company, 240, 278, 306, 330, 354.
- Paris, styles of cars used in, 191; fires on railways of, 197.
- Paris Transit Company, 270, 298, 324, 348, 372, 390, 400.
- Parkersburg, Marietta and Interurban Railway Company, 272, 300, 326, 350, 372, 390, 396, 403.
- Parks, pleasure, number owned or operated by companies and states, 30, 31, 373-375; instructions to special agents regarding, 414.
- Pasadena and Mt. Lowe Railway Company, 236, 276, 304, 328, 352, 384, 392.
- Paso Robles Street Car Company, weight of rails for, 178, 236, 276, 304, 328, 352.
- Passengers, number of, classified by power, 12, 13; number of, classified by population, 18, 19; total number of, urban centers, 19; per mile of track, 20; per car mile, classified by population, 21, 22; fare, number carried in urban centers, 24; per car mile, classified by urban centers, 26; carried, number of, for selected railways, 226; per passenger car mile, 226; fare, number of, 352-375; fare, number per mile of single track, 352-375; fare, per car hour, 352-375; fare, per car mile, 352-375; in United States, 352-375; number of, carried, 352-375; transfer, number of, 352-375; transfer, instructions to special agents regarding, 414.
- Passenger-car mileage, instructions to special agents regarding, 414.

- Passenger cars, number and style of, 189; early styles of, 190; styles of, used by inter-urban railroads, 215.
 Passenger stations, description of, 208, 209; number of, 208.
 Passenger traffic on electric lines, nature of, 111, 112.
 Patterson Heights Street Railway Company, 262, 294, 320, 346, 368.
 Paving and care of streets by railway companies, 132.
 Pawcatuck Valley Street Railway Company, 270, 296, 322, 348, 370, 389.
 Pawtucket Street Railway Company, 268, 296, 322, 348, 370, 389.
 Peekskill Lighting and Railroad Company, 258, 292, 318, 342, 366, 395, 399.
 Pelham Park Railroad Company, 258, 290, 318, 342, 364.
 Penn Incline Plane Company, 268, 296, 322, 346, 370.
 Penn Yan, Keuka Park and Branchport Railway Company, 258, 292, 318, 342, 366, 388.
 Pennsylvania, proportion of passengers to population in, 17; capitalization in, 51; income accounts of companies in, 62-65; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; interurban railways in, 102; electric railway mileage in, 102; local franchise laws in, 146; girder rail in, 179; span wire construction in, 182; sidebracket construction in, 182; linesupports in, 183; underground-feeder construction in, 183; number of cars in, 189, 190; hand and air brakes in, 203; car lighting in, 206; number of car fenders used in, 206; number of car houses in, 209; lights used in companies' buildings in, 211; power consumption in, 226; number of companies in, 232; salaried officials and clerks of, classified by number and salary, 232; wage-earners in, 232-235, 376-383; capital stock and funded debt in, 262-268; list of companies in, 262, 264, 266, 268; character and length of track in, 262, 294-297; electric construction in, 294-297; roadbed in, 294-297; cars and miscellaneous equipment in, 320-343; power and generating plants in, 344; accidents in, 368-371; car hours in, 368-371; car mileage in, 368-371; maximum speed in, 368-371; passengers carried in, 368-371; bridges and tunnels in, 389; feeder conduit system in, 391; water wheels and gas engines in, 393; alternating-current dynamos in, 396; auxiliary electric equipment in, 400; substation equipment in, 402.
 Pennsylvania and Ohio Railway Company, 260, 292, 318, 344, 366, 388, 399, 402.
 Pennsylvania Motor Company, 262.
 Pennsylvania Railroad (branch system of), electric service introduced on, 118.
 Pennsylvania Railroad Company, inquiries regarding effect of interurban electric railway competition, 117.
 Penobscot Central Railway Company, 244, 284, 310, 334, 358, 385, 401.
 Pensacola Electric Terminal Railway Company, 240, 278, 306, 330, 354.
 People's Gas and Electric Company (Ohio), 260, 294, 320, 344, 366, 388, 396.
 People's Light and Railway Company (Ill.), 242, 280, 308, 332, 356.
 People's Passenger Railway Company (Pa.), 125, 266.
 People's Railway Company (Del.), 238, 278, 306, 330, 354, 384, 397.
 People's Railway Company of Dayton, 260, 294, 320, 344, 366.
 People's Railway Company of Cleveland, 145.
 People's Street Railway Company (Pa.), 264, 296, 322, 346, 368, 389, 400.
 People's Street Railway Company (Iowa), 242, 282, 308, 332, 356.
 People's Traction Company (Pa.), 125, 266.
 People's Tramway Company (Conn.), 238, 278, 306, 330, 354, 384, 392, 394, 397, 401.
 Peoria and Pekin Terminal Railway Company, 118, 242, 280, 308, 332, 356, 385, 394, 397.
 Peoria and Prospect Heights Railway Company, 242, 280, 308, 332, 356, 385.
 Petaluma Street Railway Company, 236, 276, 304, 328, 352.
 Philadelphia, trackage and traffic in, 24; capitalization in, 53; holding companies in, 122; street railway consolidation in, 124, 125; regulation of franchises in, 146; stringer, construction in, 173; trolley construction in, 184; style and dimensions of cars in, 194.
 Philadelphia and Chester Railway Company, 262, 294, 320, 346, 368, 389.
 Philadelphia and Darby Railroad Company, 125, 264.
 Philadelphia and Grays Ferry Passenger Railway Company, 264.
 Philadelphia and Lehigh Valley Traction Company, 262, 294, 320, 344, 368, 389.
 Philadelphia and Westchester Traction Company, 266, 296, 322, 346, 370, 389, 402.
 Philadelphia, Bristol, and Trenton Street Railway Company, 266, 296, 322, 346, 368.
 Philadelphia, Cheltenham, and Jenkintown Passenger Railway Company, 266.
 Philadelphia City Passenger Railway Company, 125, 264.
 Philadelphia, Morton, and Swarthmore Street Passenger Railway Company, 262.
 Philadelphia Rapid Transit Company, 125, 177.
 Philadelphia Traction Company, 125, 264.
 Phillipston Street Railway Company, 250.
 Phoenix Railway Company, 54, 236, 276, 304, 328, 352, 384.
 Pinkus, Henry, 161.
 Pittsburg, trackage and traffic in, 24; capitalization in, 53; style and dimensions of cars in, 194.
 Pittsburg and Birmingham Traction Company, 266.
 Pittsburg and Castle Shannon Railroad Company, 268, 296, 322, 346, 370.
 Pittsburg and Charleroi Street Railway Company, 266.
 Pittsburg Incline Plane Company, 266.
 Pittsburg, McKeesport and Connellsville Railway Company, 268, 296, 322, 346, 370, 389, 400.
 Pittsburg, McKeesport and Greensburg Railway Company, 268, 296, 322, 346, 370, 389.
 Pittsburg Railways Company (Kan.), 244, 282, 310, 334, 358, 385, 394.
 Pittsburg Railways Company (Pa.), 81, 122, 177, 182, 189, 204, 211, 221, 266, 296, 322, 346, 370, 389, 396, 400, 402.
 Pittsfield Electric Street Railway Company, 248, 286, 312, 336, 360, 386, 391.
 Pittston and Scranton Street Railway Company, 268.
 Plants, lighting, in connection with street railways, 13; power and generating, 328-351.
 Plattsburg Traction Company, 258, 292, 318, 342, 366.
 Pleasure resorts, instructions to special agents regarding, 414. *See also* Parks.
 Plymouth and Sandwich Street Railway Company, 248, 286, 312, 336, 360.
 Point Pleasant Traction, Electric Light and Power Company, 254, 290, 316, 340, 364, 395.
 Poles, trolley, annual license fees for, 132; metal, 185; wooden, 185; number of, to the mile, 277-303; steel or iron, miles of, 277-303; wooden, miles of, 277-303.
 Pomona Street Railway Company, 236, 276, 304, 328, 352.
 Population, classification of companies according to, 4, 5; relation of traffic to, 9, 10; proportion of passengers to, 17-23; relation of trackage and traffic to, 19, 24-26; accidents on electric railways classified by, 23; urban, distribution of, by street railways, 26-28; relation of earnings to, 105, 106.
 Port Jervis Electric Light, Power, Gas and Railroad Company, 258, 292, 318, 342, 366, 395.
 Portland Railway Company (Oreg.), 262, 294, 320, 344, 368, 388, 400.
 Portland Railroad Company (Me.), 246, 284, 310, 334, 358, 386, 398.
 Portland City and Oregon Railway Company, 262, 294, 320, 344, 368, 388.
 Porto Rico, income accounts of companies in, 63, 64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; number of companies in, 232; salaried officials and clerks of, 232; wage-earners of, 232-235; list of companies in, 274; capital stock and funded debt in, 274, 275; character and length of track in, 274, 302; electric construction in, 302; roadbed in, 302; cars and miscellaneous equipment in, 326; power and generating plants in, 350; accidents in, 374; car hours in, 374; car mileage in, 374; maximum speed in, 374; passengers in, 374; bridges and tunnels in, 390; alternating-current dynamos in, 396.
 Portsmouth and Exeter Street Railway Company, 252.
 Portsmouth Electric Railway (N. H.), (owned and operated by Boston and Maine Railroad), 254, 288, 316, 340, 362, 387, 399, 402.
 Portsmouth, Kittery and York Street Railway Company (Me.), 246, 284, 310, 334, 358, 386, 398, 401.
 Portsmouth, Kittery and York Street Railway (N. H.), 254.
 Portsmouth Street Railroad and Light Company (Ohio), 260, 294, 320, 344, 368, 396.
 Pottstown Passenger Railway Company, 268, 296, 322, 346, 370.
 Pottsville Union Traction Company, 268, 296, 322, 346, 370, 389.
 Poughkeepsie City and Wappingers Falls Electric Railway Company, 258, 292, 318, 342, 366.
 Power, classification of, 4; traffic of companies classified according to, 12-17; condensed income account for operating companies according to, 55; percentage distribution of gross income of operating companies according to, 56; operating earnings of companies according to, 67; percentage distribution, by sources, of operating earnings of companies according to, 67; general results of operations of all companies according to, 82; operating ratio of companies, 84; electric, 172, 224; consumption and cost of, 223, 229; animal, cost of, 224; cable, cost of, 224; consumption of, for selected electric railways, 226; consumption of, per car mile, for electric railways, 226; animal, length of track operated by, 276-303.
 Power and generating plants, 328-351.
 Power houses, equipment and output of, 218-229; location of, 219; construction of, 220; insurance requirements for, 220; storing of coal in, 222; number of, 328-351.
 Power plants, operating expenses of, 72, 73, 76; description of, 218-223; capacity of, for companies which sell current, 224; capacity of, for companies which do not sell current, 224; cost of operation of, in cities, 227; instructions to special agents regarding, 409, 415, 416, 419.
 Preferred stock. *See* Stock.

- Presidio and Ferries Railroad Company**, 236, 276, 304, 328, 352.
Price Hill Incline Plane Railroad Company, 260, 292, 318, 344, 366.
Printing, instructions to special agents regarding, 420.
Printing and stationery, expenses of, 75; percentage distribution of operating expenses of, 76.
Profit and loss, deficit for companies reporting deficit, 90; surplus for companies reporting surplus, 91.
Promissory notes, use of, 44.
Providence, trackage and traffic in, 24.
Providence and Danielson Railway Company (R. I.), 270, 296, 322, 348, 370, 403.
Providence and Fall River Street Railway Company (Mass.), 248, 284, 312, 336, 360, 386.
Pueblo Traction and Lighting Company, 238, 276, 304, 328, 352, 393, 397.
Public Works Company, Street Railway and Lighting Department, 244, 284, 310, 334, 358, 394, 398, 401.
Punxsutawney Street Passenger Railway Company, 94, 268, 296, 322, 346, 370, 389.

Quakertown Traction Company, 262.
Quincy Horse Railway and Carrying Company, 242, 280, 308, 332, 356.

Radford Water Power Company, 272, 300, 326, 350, 372, 393, 396, 400.
Railroad Commission in Massachusetts, authority of, 126.
Rails, weight per yard of, 47, 277, 303; flat or tram, 174; T or Vignole, 174-179; range of weight of, 178, 179; girder, use of, 179; third, 179; instructions to special agents regarding weight of, 415.
Railway and Electric Company of Sedalia, 252, 288, 314, 338, 362, 387, 395, 399, 402.
Railways, consolidation of, 120-125; instructions to special agents regarding, 413-421.
Railways Company General, 122.
Raleigh Electric Company, 258, 292, 318, 342, 366, 395.
Rapid City Street Railway Company, 54, 270, 298, 324, 348, 370.
Rapid Transit Company of Chattanooga (Tenn.), 270, 298, 324, 348, 370, 389, 400.
Rapid Transit Railway Company (Tex.), 270, 298, 324, 348, 372, 390.
Rapid Transit Street Railway Company (N. J.), 254.
Raritan Traction Company, 254, 290, 316, 340, 364, 387.
Reading and Southwestern Street Railway Company, 268.
Reading and Temple Electric Railway Company, 268.
Reading and Womelsdorf Electric Railway Company, 268.
Reading City Passenger Railway Company, 268.
Reading Traction Company, 268.
Reading, Wakefield and Lynnfield Street Railway Company, 250, 286, 312, 336, 360, 386.
Real estate, taxes on, 64; instructions to special agents regarding, 416.
Red Lion and Windsor Street Railway Company, 268, 296, 322, 346, 370, 400.
Red Oak Street Railway Company, 244, 282, 310, 334, 356.
Redlands Street Railway Company, 236, 276, 304, 328, 352, 384, 397, 401.
Referendum, use of, in granting franchises, 127.
Rentals, expenses of, 66, 74, 75.
Rents, effect of railways on, 30.
Revenue cars, instructions to special agents regarding, 419.

Rhode Island, proportion of passengers to population in, 17; companies not reporting financial transactions in, 54; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; dividends in, 82; assets and liabilities of companies in, 90, 91; authority of legislature to grant charters in, 126; regulation of capitalization in, 133; franchise laws in, 147; car lighting in, 206; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of companies in, 268, 270; capital stock and funded debt in, 268; electric construction in, 296, 297; character and length of track in, 268, 296, 297; roadbed in, 296, 297; cars and miscellaneous equipment in, 322; power and generating plants in, 348; accidents in, 370; car hours in, 370; car mileage in, 370; maximum speed in, 370; passengers in, 370; bridges and tunnels in, 389; auxiliary electric equipment in, 400; substation equipment in, 403.
Rhode Island Company, 122, 123.
Rhode Island Securities Company, 123.
Rhode Island Suburban Railway Company, 147, 212, 270, 296, 322, 348, 370, 389, 403.
Richmond, trackage and traffic in, 19.
Richmond and Petersburg Electric Railway Company (Va.), 272, 300, 326, 350, 372, 390, 400.
Richmond Passenger and Power Company (Va.), 54, 272, 300, 326, 350, 372.
Richmond Street and Interurban Railway Company (Ind.), 242, 282, 308, 332, 356, 385, 398, 401.
Richmond Traction Company (Va.), 54, 272, 300, 326, 350, 372.
Rides, proportion of, to population, 9, 19.
Ridge Avenue Connecting Railway Company, 266.
Ridge Avenue Passenger Railway Company, 266.
Right of way, instructions to special agents regarding, 414, 416.
Ringier Rocks Electric Railway Company, 268, 296, 322, 346, 370, 389.
Riverside and Arlington Railway Company, 236, 276, 304, 328, 352, 384.
Riverview Electric Street Railway Company, 262, 294, 320, 346, 368.
Roadbed, construction of, 173, 174; character and length of, 276-303.
Roadmen, number and wages of, 234, 379.
Roadway construction, instructions to special agents regarding, 416, 417.
Roanoke Railway and Electric Company, 272, 300, 326, 350, 372, 390, 396.
Rochester and Sodus Bay Railway Company, 182, 258, 292, 318, 342, 366, 388, 395, 399, 402.
Rochester and Suburban Railway Company, 258, 292, 318, 342, 366.
Rochester, Charlotte and Manitou Railroad Company, 258, 292, 318, 342, 366, 388.
Rochester Electric Railway Company, 258.
Rochester Railway Company, 173, 174, 258, 292, 318, 342, 366, 388, 391, 399.
Rock Hill Water Supply, Electric Light and Street Railway Company, 270, 298, 324, 348, 370, 389.
Rockford and Belvidere Electric Railway Company, 242, 280, 308, 332, 356, 385.
Rockford Railway, Light and Power Company, 242, 280, 308, 332, 356.
Rockland, Thomaston and Camden Street Railway Company, 246, 284, 310, 334, 358, 386, 394.
Rome City Street Railway Company, 258, 292, 318, 342, 366.
Roxboro, Chestnut Hill and Norristown Railway Company, 264.
Rutland Street Railway Company, 272, 298, 324, 348, 372.

Sacramento, trackage and traffic of, 19.
Sacramento Electric, Gas and Railway Company, 236, 276, 304, 328, 352, 384, 392, 393, 397, 401.
Safety gate, uses of, 205.
Saginaw Valley Traction Company, 250, 286, 314, 338, 362, 386, 395, 398.
St. Albans Street Railway Company, 272, 298, 324, 348, 372, 390, 400.
St. Charles Street Railroad Company, 244, 282, 310, 334, 358.
St. Clair Incline Plane Company, 268, 296, 322, 346, 370.
St. Joseph, Mo., trackage and traffic in, 24.
St. Joseph Railway, Light, Heat and Power Company, 252, 288, 314, 338, 362, 387, 395, 399.
St. Louis, trackage and traffic in, 24; capitalization in, 53; stringer construction in, 173; cast welded track in, 178; overhead construction in, 184; pole construction in, 186; style and dimensions of cars in, 194; use of direct-current power plants in, 221.
St. Louis and Belleville, (Ill.), Electric Railway Company, 189, 240, 280, 308, 332, 356, 385.
St. Louis and East St. Louis Electric Railway Company (Ill.), 240, 280, 308, 332, 356.
St. Louis and Kirkwood Railroad Company (including Brentwood, Clayton and St. Louis Railroad Company), 252, 288, 314, 338, 362, 387, 399.
St. Louis and Meramec River Railroad Company, 252, 288, 314, 338, 362, 387.
St. Louis and Suburban Railway Company, 252, 288, 314, 338, 362, 387, 395, 399, 402.
St. Louis, St. Charles and Western Railway, 212, 252, 288, 314, 338, 362, 387.
St. Louis Transit Company, 79, 121, 177, 189, 252, 288, 314, 338, 362, 387, 391, 395, 399, 402.
St. Paul, Minn., center pole construction in, 182; span wire construction in, 182.
Salaries of employees, 73, 74; percentage distribution of, 76; amount of, in 1902, 94; inquiries regarding, in census schedule, 411; of officers, clerks, instructions to special agents regarding, 420, 421.
Salem Electric Railway Company (Ohio), 260, 294, 320, 344, 368.
Salem Light, Power and Traction Company (Oreg.), 262, 294, 320, 344, 368, 388, 396.
Salt Lake and Utah Valley Railway Company, 270, 298, 324, 348, 372, 390.
Salt Lake City, relation of trackage and traffic to population of, 19.
San Antonio, relation of trackage and traffic to population of, 19.
San Antonio Traction Company, 270, 298, 324, 348, 372, 390.
San Bernardino Valley Traction Company, 236, 276, 304, 328, 352, 384, 397.
San Diego, relation of trackage and traffic to population of, 19.
San Diego Electric Railway Company, 236, 276, 304, 328, 352, 397.
San Francisco, trackage and traffic in, 24; capitalization in, 53; conduit system of, 179; style and dimensions of cars in, 194.
San Francisco charter, regulations of railways by, 136.
San Francisco, Oakland and San Jose Railway Company, bridge construction of, 186.
San Jose and Santa Clara Railroad Company, 236, 276, 304, 328, 352, 384, 392, 397.
San Jose Railroad Company, 236, 276, 304, 328, 352.
San Juan Light and Transit Company, 274, 300, 326, 350, 374, 390, 396.
Sanding track, expenditures for, instructions to special agents regarding, 419.
Sanford and Cape Porpoise Railway Company, 246, 284, 310, 334, 358, 386, 392, 401.
Santa Barbara, Cal., trackage and traffic in, 19.

- Santa Barbara Consolidated Railway Company, 236, 276, 304, 328, 352.
- Santa Cruz Electric Railway Company, 236, 276, 304, 328, 352.
- Santa Rosa Street Railway Company, 236, 276, 304, 328, 352.
- Savannah Electric Company, 240, 278, 306, 330, 354, 385, 394.
- Schedules street railway, 112, 113, 117, 407-411.
- Schenectady, Railway, growth in freight and express of, 105; standard type of wooden pole used on, 185; railway company, 210, 258, 292, 318, 342, 366, 395, 399, 402.
- Schenectady Railway Company, 210, 258, 292, 318, 342, 366, 395, 399, 402.
- Schuylkill Traction Company, 264, 296, 322, 346, 368, 389.
- Schuylkill Valley Traction Company, 264, 296, 322, 346, 368, 389, 400.
- Scranton, trackage and traffic in, 24.
- Scranton and Carbondale Traction Company, 268.
- Scranton and Pittston Traction Company, 268.
- Scranton Railway Company, 268, 296, 322, 346, 370, 389, 400.
- Sea Cliff Incline Cable Railway Company, 258, 292, 318, 342, 366.
- Sea View Railroad Company, 268, 296, 322, 348, 370, 389, 400, 403.
- Seabrook and Hampton Beach Street Railway Company, 252.
- Seashore Electric Railway Company, 254.
- Seattle and Renton Railway Company, 272, 300, 326, 350, 372, 390.
- Seattle Electric Company, 272, 300, 326, 350, 372, 390, 396, 400, 403.
- Second and Third Streets Passenger Railway Company, 266.
- Second Avenue Railway, 123, 256.
- Securities, extent of, 44.
- Seguin Street Railway Company, 270, 298, 324, 348, 372.
- Selma Street and Suburban Railway Company, 236, 276, 304, 328, 352.
- Semiconvertible cars, styles and dimensions of, in specified cities, 193.
- Service, car, frequency of, 110.
- Seventeenth and Nineteenth Streets Passenger Railway Company, 264.
- Shamokin and Edgewood Electric Railway Company, 268, 296, 322, 346, 370, 389.
- Shamokin and Mt. Carmel Electric Railway Company, 268, 296, 322, 346, 370, 389, 400.
- Sheboygan Light, Power and Railway Company, 274, 300, 326, 350, 374, 396.
- Shelburne Falls and Coleraine Street Railway Company, 248, 286, 312, 336, 360, 386, 392.
- Shop tools, instructions to special agents regarding, 416; expenses, 418, 419.
- Short, Prof. Sidney H., 165, 166.
- Shreveport, La., relation of trackage and traffic to population of, 19.
- Shreveport Belt Railway Company (Shreveport Traction Company), 244, 282, 310, 334, 358, 385.
- Side bracket construction, 182; purpose and method of, 185.
- Sidings and turnouts, length of, for States and companies, 276-303.
- Siemens, Dr. Werner, 161.
- Signaling, interurban, development of, 188.
- Single track mileage, 172.
- Sioux City, relation of trackage and traffic to population of, 19.
- Sioux City Traction Company, 244, 282, 310, 334, 356, 385.
- Sixth Avenue Railroad, 123, 256.
- Skowhegan and Norridgewock Railway and Power Company, 246, 284, 310, 334, 358, 386.
- Sliding-scale system, 133, 134.
- Snowplows, number of, 189, 190, 304-327.
- Somerset Traction Company, 246, 284, 310, 334, 358, 386.
- Somerville Horse Railroad Company, 248.
- South Atlantic division, relation of traffic to population in, 9.
- South Carolina, proportion of passengers to population, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; list of railway companies in, 270; capital stock and funded debt in, 270, 271; character and length of track in, 270, 298; electric construction in, 298; roadbed in, 298; cars and miscellaneous equipment in, 324; power and generating plants in, 348; accidents in, 370; car hours in, 370; car mileage in, 370; maximum speed in, 370; passengers in, 370; bridges and tunnels in, 389; alternating-current dynamos in, 396; auxiliary electric equipment in, 400; substation equipment in, 403.
- Southbridge and Sturbridge Street Railway Company, 248, 286, 312, 336, 360, 386.
- South Central division, relation of traffic to population in, 9.
- South Chicago City Railway Company, 54, 240, 280, 308, 332, 356, 397.
- South Dakota, companies failing to report financial transaction in, 54; list of companies in, 270; capital stock and funded debt of, 270, 271; character and length of track in, 270, 298; electric construction in, 298; roadbed in, 298; cars and miscellaneous equipment in, 324; power and generating plants in, 348; accidents in, 370; car hours in, 370; car mileage in, 370; maximum speed in, 370; passengers in, 370.
- South Ferry Railway, 123.
- South Manchester Light, Power, and Tramway Company, 238.
- South Middlesex Street Railway Company, 248, 286, 312, 336, 360, 386.
- South Orange and Maplewood Traction Company, 254, 288, 316, 340, 364, 387.
- South Side Elevated Railway Company (Ill.), 81, 179, 196, 201, 240, 280, 308, 332, 356, 397.
- South Side Passenger Railway Company (Pa.), 268, 296, 322, 346, 370.
- Southern Boulevard Railroad Company, 256, 290, 318, 342, 364.
- Southern Ohio Express Company, 217.
- Southfield Beach Railroad Company, 258, 292, 318, 342, 366, 388.
- Southside Railway and Development Company, 54, 272, 300, 324, 350, 372.
- Southwest Missouri Electric Railway Company, 252, 288, 314, 338, 362, 387, 395, 402.
- Southwestern Street Railway Company, 266, 296, 322, 346, 368.
- Spain, street railways in, 156.
- Span wire construction, 181, 182, 184, 185.
- Spartanburg Railway, Gas and Electric Company, 270, 298, 324, 348, 370, 389, 396.
- Special agents, general instructions to, 413-421.
- Speed, 31, 32; limiting, of surface railways, 34, 35; high, 167; maximum in, 352-375; instructions to special agents regarding, 414.
- Spokane, Wash., trackage and traffic in, 19.
- Spokane and Montrose Motor Railroad Company, 272, 300, 326, 350, 372.
- Sprague, Frank J., 167-170.
- Springfield, Ill., trackage and traffic in, 19.
- Springfield, Mo., trackage and traffic in, 19.
- Springfield, Ohio, trackage and traffic in, 19.
- Springfield and Eastern Street Railway Company (Mass.), 250, 286, 312, 336, 360, 386, 392, 398.
- Springfield and Western Traction Company (Ohio), 260.
- Springfield and Xenia Traction Company (Ohio), 260, 294, 320, 344, 368, 388, 396, 399, 402.
- Springfield Consolidated Railway Company (Ill.), 242, 280, 308, 332, 356.
- Springfield Electric Railway Company (Vt.), 272, 298, 324, 348, 372, 390.
- Springfield Railway Company (Ohio), 260, 294, 320, 344, 368.
- Springfield Street Railway Company (Mass.), 250, 286, 312, 336, 360, 386, 391.
- Springfield Traction Company (Mo.), 252, 288, 314, 338, 362.
- Stable expenses, instructions to special agents regarding, 420.
- Stablemen, number and wages of, 234.
- Stamford Street Railroad Company, 238, 278, 306, 330, 354.
- Stark Electric Railroad Company, 260, 292, 318, 344, 366, 388, 395, 399.
- Starters, number and wages of, 233.
- State Electric Company, 242, 282, 308, 334, 356.
- State governments, authority of, 126; railway construction in New England and New York controlled by, 127; local franchises regulated by, 136-148.
- Staten Island Electric Railroad Company, 258, 292, 318, 342, 366, 388.
- Staten Island Midland Railroad Company, 258, 292, 318, 342, 366.
- States, trackage and traffic in, 16, 17.
- Stationery, instructions to special agents regarding expenditures for, 420.
- Stations, street railway passengers, 208, 209; number of, 305-327; output of, 329-351, 409-415; instructions to special agents regarding, 414.
- Statistics, wage, method of presentation of, 97.
- Steam engines, number of, 218.
- Steam plants, maintenance of, instructions to special agents regarding, 417.
- Steam power on surface railways, 4, 56, 67, 77, 82, 84; on elevated railways, 169.
- Steam railroads, 3; influence of interurban electric railways on, 116-119; introduction of electric service on, 118, 119; protection of crossings of, 188.
- Steam railway crossings, 188.
- Steam turbines, 222.
- Stephenson, John, 191.
- Steubenville and Pleasant Heights Traction Company, 260, 294, 320, 344, 368.
- Steubenville Traction and Light Company, 216, 260, 294, 320, 344, 368, 388, 402.
- Stock, preferred, number of companies issuing, 46; dividends on, 80; common, 80; capital, and funded debt, 236-275; form of schedule used in census inquiries regarding, 410.
- Stockton Electric Railroad Company, 236, 276, 304, 328, 352.
- Stops, frequency of, 110.
- Storage batteries. *See Batteries.*
- Storeroom, expenses, instructions to special agents regarding, 420.
- Stott, H. G., 228.
- Stoughton and Randolph Street Railway Company, 250, 286, 312, 336, 360.
- Street Railway Accountants' Association of America, system used in schedule of inquiries by, 54, 407, 415; instructions to special agents regarding, 415, 416.
- Street Railway Journal, map, prepared by, 103.
- Stroudsburg Passenger Company, 268, 296, 322, 346, 370.
- Substations, equipment of, 223; equipment for specified companies, 223, 401; form of schedule used in census inquiries regarding, 409; instructions to special agents regarding, 415.
- Suburban lines, 101.

Suburban Railroad Company, 240, 280, 308, 332, 356, 385.
 Suburban Rapid Transit Street Railway Company, 266.
 Suburbs, influence of electric railways on, 28, 29, 172, 173.
 Subway in Boston, length of lease of, 135; municipal ownership of, 135.
 Subway in New York, cost of, 135; terms of the lease of, 135; municipal ownership of, 135, 144.
 Subways, 36-39.
 Suffield Street Railway Company, 238, 278, 306, 330, 354.
 Sunbury and Northumberland Electric Railway Company, 268, 296, 322, 346, 370.
 Superintendence, instructions to special agents regarding, 416, 419.
 Superintendents, number and salaries of, 232.
 Supplies, by states and territories, 90.
 Surface railway companies, full-time electric, income accounts, 60, 61; general results of operation of, 85-87.
 Surface railways, 46, 55, 56, 67, 68, 77, 82, 84, 86, 88; instructions to special agents regarding, 412.
 Surface roads, third-rail construction on, 179.
 Surplus, net, by states, 91.
 Susquehanna Traction Company, 264, 296, 322, 346, 368, 389.
 Sweepers, number of, 190, 304-327.
 Switchboard men, number and wages of, 235.
 Switches, electric, description of, 201.
 Switchmen, number and wages of, 234.
 Switzerland, street railways in, 156.
 Syracuse and Suburban Railroad Company, 258, 292, 318, 342, 366, 388, 392, 399.
 Syracuse, trackage and traffic in, 24.
 Syracuse, Lakeside and Baldwinsville Railway Company, 258, 292, 318, 342, 366, 388.
 Syracuse Rapid Transit Railway Company, 258, 292, 318, 342, 366, 388.
 T rail, 174, 178, 179.
 Tacoma Railway and Power Company, 272, 300, 326, 350, 372, 390, 396, 400.
 Tama and Toledo Electric Railway and Light Company, 244, 282, 310, 334, 356, 394, 398.
 Tamaqua and Lansford Street Railway Company, 268, 296, 322, 346, 370, 389.
 Tampa Electric Company, 240, 278, 306, 330, 354, 384, 392, 394, 401.
 Tarentum Traction Passenger Railway Company, 268, 296, 322, 346, 370.
 Tarrytown, White Plains and Mamaroneck Railway Company, 124, 258, 290, 318, 342, 364.
 Taxes, of operating and lessor companies, 64-66.
 Tazewell Street Railway Company, 272, 300, 326, 350, 372.
 Telephone lines, uses of, 212; miles of exclusive, 305-327; instructions to special agents regarding, 414.
 Templeton Street Railway Company, 250, 286, 312, 336, 360, 386.
 Tennessee, proportion of passengers to population in, 17; income accounts of companies in, 62-64; percentage of taxes to income in, 66; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities in, 90, 91; woods used for car construction in, 193; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; character and length of track in, 270, 298; capital stock and funded debt in, 270, 271; electric construction in, 298; list of companies in, 270; road bed in, 298; cars and miscellaneous equipment in, 324; power and generating plants in, 348; accidents in, 370; car hours in, 370; car mileage in, 370; maximum speed in, 370; pas-

sengers in, 370; bridges and tunnels in, 389; alternating-current dynamos in, 396; auxiliary electric equipment in, 400.
 Terminals, instructions to special agents regarding, 421.
 Terre Haute Electric Company, 242, 282, 308, 332, 356, 385, 394.
 Texarkana Railway Company, 236, 276, 304, 328, 352.
 Texas, proportion of passengers to population in, 17; income accounts of companies in, 62-64; gross earnings from operation in, 70; operating expenses in, 72-75; assets and liabilities of companies in, 90, 91; T rail in, 179; girder rail in, 179; power consumption in, 226; number of companies in, 232; salaried officials and clerks in, 232; wage-earners in, 232-235, 376-383; character and length of track in, 270, 298; list of companies in, 270; capital stock and funded debt in, 270, 271; electric construction in, 298; roadbed in, 298; cars and miscellaneous equipment in, 324; power and generating plants in, 348; accidents in, 370; car hours in, 370; car mileage in, 370; maximum speed in, 370; passengers in, 370; bridges and tunnels in, 389; alternating-current dynamos in, 396; auxiliary electric equipment in, 400; substation equipment in, 403.
 Thermal efficiency, variations in, 227-229.
 Third Avenue Railroad Company, 45, 79, 81, 85, 124, 180, 181, 256, 290, 318, 342, 364.
 Third-rail, invention of, 161; systems, 179; use of, 196; traction, description of, 214.
 Thirteenth and Fifteenth Streets Passenger Railway Company, 266.
 Thirty-fourth Street Crosstown Railway Company, 123, 256, 290, 318, 342, 364.
 Thirty-fourth Street Ferry and Eleventh Avenue Company, 123.
 Tiffin, Fostoria and Eastern Electric Railway Company, 260, 294, 320, 344, 368, 388.
 Titusville Electric Traction Company, 268, 296, 322, 346, 370, 389, 400.
 Toledo, Ohio, trackage and traffic in, 24.
 Toledo and Maumee Valley Railway Company, 260, 294, 320, 344, 368, 388, 393, 399.
 Toledo and Monroe Railway Company, (Mich.), 250, 286, 314, 338, 362, 386, 395, 398, 402.
 Toledo and Western Railway Company, 216, 260, 294, 320, 344, 368, 388, 396, 399, 402.
 Toledo, Bowling Green and Southern Traction Company, 260, 294, 320, 344, 368, 388, 396, 399.
 Toledo, Fostoria and Findlay Railway Company, 260, 294, 320, 344, 368, 388, 399.
 Toledo Railways and Light Company, 260, 294, 320, 344, 368, 391, 396, 399.
 Tools, shop, instructions to special agents regarding, 416.
 Topeka, proportion of passengers to population, 19.
 Topeka Railway Company, 244, 282, 310, 334, 358, 385.
 Torrington and Winchester Street Railway Company, 238, 278, 306, 330, 354, 384.
 Trackage, of operating and lessor companies, 6; and motive power, increase in length of line, 7, 8; in urban centers, 19, 23-26, 101, 102; total number of miles of, 19, 24; passengers per mile of, 26; number of miles of, not reporting financial transaction, 54; of surface railways in United Kingdom, 149; of street railways in Germany, 152-154; of street railways in specified cities of France, 154, 155; statistics of, 172-178; length of single, 172, 236-275; character and length of, 276-303; form of schedule used in census inquiries regarding, 408; instructions to special agents regarding, 414, 416, 417, 419, 421.
 Trackmen, number and wages of, 234, 379.

Traction, replacement by electricity of other methods of, 8; electric, history of, 159-171; mechanical, 276-303.
 Traction companies, act of 1887 for the benefit of, 125.
 Traffic, of operating and lessor companies, 6, 9; relation to population, 9, 10, 16-21, 23-26, 111, 112; of companies classified by power, 12-17; density of, per mile of track, 13-15; of companies, 17-23; in selected urban centers, 23-26; unequal distribution, 33, 34; growth of, 105; in selected interurban railways, 109; freight and express, on electric lines, 112; of surface railways in United Kingdom, 149; of tramways in United Kingdom, 150, 152; of street railways in Germany, 152-154; of street railways in France, 154, 155; form of schedule used in census inquiries regarding, 407; instructions to special agents regarding, 414.
 Tramway Stock Company, 274, 302, 326, 350, 374.
 Transfer points, number of, 352-375.
 Transfers, 41-43, 145; instructions to special agents regarding, 414.
 Transformers, number and horsepower of, 401-403.
 Transportation, inadequacy of, 31-33; operating expenses, 72, 73; free, for policemen, 132; instructions to special agents regarding, 419.
 Trappe and Limerick Electric Street Railway Company, 264.
 Trenton, Lawrenceville and Princeton Railroad Company, 254, 290, 316, 340, 364.
 Trenton Street Railway Company, 254, 290, 316, 340, 364, 387, 399, 402.
 Tri-City Railway Company, 242, 282, 310, 334, 356, 385.
 Trolley cars, number and speed of, 102; overhead, 162, 163, 183-186; contact, under-running, 163, 164; power, overhead, single-track mileage in, 172; single overhead, advantages of, 183, 184; double overhead, disadvantages of, 183, 184; overhead, devices for using the current used in, 203; overhead, length of, 276-303.
 Troy and Cohoes Railroad Company, 254.
 Troy and New England Railway Company, 254, 290, 316, 340, 364, 387.
 Truck frames, types of, 192.
 Tucson Street Railway Company, 236, 276, 304, 328, 352, 384.
 Tunnels, 186-188.
 Turnouts and sidings, length of, 276-303.
 Tuscaloosa Belt Railway Company, 236, 276, 304, 328, 352, 384.
 Tuscarawas Traction Company, 260, 294, 320, 344, 366, 388, 396.
 Twenty-eighth and Twenty-ninth Street Crosstown Railroad Company, 123, 256, 290, 318, 342, 364.
 Twenty-second Street and Allegheny Avenue Passenger Railway Company, 266.
 Twenty-third Street Railroad Company, 123, 256.
 Twin City General Electric Company, 250, 286, 314, 338, 360, 386, 395.
 Twin City Rapid Transit Company, 81, 176, 177, 182, 184, 218, 221, 250, 286, 314, 338, 362, 391, 392, 395, 399, 402.
 Underground feeder construction, 183.
 Union Consolidated Elevated Railway Company (Ill.), 240.
 Union Electric Company (Iowa), 242, 282, 310, 334, 356, 385, 394, 398.
 Union Passenger Railway Company (Pa.), 125, 264.
 Union Railroad Company (R. I.), 147, 212, 268, 296, 322, 348, 370, 400, 403.
 Union Railway Company (Pa.), 262.
 Union Railway Company of New York, 124, 256, 290, 318, 342, 364.

